PB82-231283

Dual Alkali Acceptance Test at Louisville Gas and Electric Company; Volume III
Appendices G-J

Bechtel Corp.
San Francisco, CA

Prepared for

Industrial Environmental Research Lab.
Research Triangle Park, NC

Sep 81

U.S. Department of Commerce
National Technical Information Service
NTIS

EPA-600/7-81-159c
September 1981

PB82-231283

DUAL ALKALI ACCEPTANCE TEST
AT LOUISVILLE GAS AND ELECTRIC COMPANY

VOLUME III
Appendices G-J

September 1981

by

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U.S. Environmental Protection Agency
Office of Research and Development
Washington, D.C. 20460

REPRODUCED BY
NATIONAL TECHNICAL
INFORMATION SERVICE
U.S. DEPARTMENT OF COMMERCE
SPRINGFIELD, VA. 22161

TECHNICAL REPORT DATA

(Please read Instructions on the reverse before completing)

1. REPORT NO. EPA-600/7-81-159c	2.	3. RECIPIENT'S ACCESSION NO. PB82 23128 3
4. TITLE AND SUBTITLE Dual Alkali Acceptance Test at Louisville Gas and Electric Company; Volume III. Appendices G-J		5. REPORT DATE September 1981
		6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S) D. Watson, T. Martin, J. Donnelly, and N. Zoueshtiagh (Bechtel); R. VanNess (LG/E); C. LaMantia and L. Woodland (ADL); and R. Tussey (Kenvirons)		8. PERFORMING ORGANIZATION REPORT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS Bechtel National, Inc. P.O. Box 3965 San Francisco, California 94119		10. PROGRAM ELEMENT NO.
		11. CONTRACT/GRANT NO. 68-02-2634
12. SPONSORING AGENCY NAME AND ADDRESS EPA, Office of Research and Development Industrial Environmental Research Laboratory Research Triangle Park, NC 27711		13. TYPE OF REPORT AND PERIOD COVERED Phase III Final; 4/79-7/80
		14. SPONSORING AGENCY CODE EPA/600/13

15. SUPPLEMENTARY NOTES IERL-RTP project officer is Norman Kaplan, Mail Drop 61; 919/541-2556. This is Phase III report: EPA-600/7-79-221a and -221b cover Phase II; EPA-600/7-78-010 and -010a cover Phase I.

16. ABSTRACT The report gives results of the completed acceptance test series run on the dual alkali system serving Louisville Gas and Electric Company's Cane Run Unit 6 boiler. Test results, measuring system performence, included: (1) SO2 removal averaged 94% and 143 ppm outlet concentration; (2) soda ash consumption averaged 0.042 mole soda ash per mole SO2 removed; (3) lime consumption averaged 1.04 mole CaO per mole SO2 removed; (4) power consumption averaged 1.05% of generation; (5) filter cake solids averaged 52.2 wt % insoluble solids; and (6) there was no net particulate matter addition. Various problems attributable to the boiler, the FGD system, and the quality and quantity of the carbide lime supplied to the system delayed acceptance testing until July 1980. The year-long demonstration period officially started in May 1980. The problems experienced and their solutions are discussed. Volume I discusses the test and contains Appendices A-C. Volume II contains Appendices D-F. This volume (Volume III) contains raw data gathered by Kenvirons, calculations, and computerized reduced data submitted to Bechtel by Kenvirons.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS		b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group	
Pollution	Sulfur Dioxide	Pollution Control	13B	07B
Boilers	Sodium Carbonates	Stationary Sources	13A	
Flue Gases	Calcium Oxides	Dual Alkali System	21B	
Scrubbers	Dust	Particulate	07A,13I	11G
Desulfurization	Aerosols		07D	
Tests	Acceptability		14B	14G

18. DISTRIBUTION STATEMENT Release to Public	19. SECURITY CLASS *(This Report)* Unclassified	21. NO. OF PAGES 375
	20. SECURITY CLASS *(This page)* Unclassified	22. PRICE

EPA Form 2220-1 (9-73)

PREFACE

Volumes II and III of this report contain the results of the stack sampling for particulate matter and sulfur dioxide emissions conducted by Kenvirons, Inc. under subcontract to Bechtel National, Inc. Volume II contains Kenviron's test program description, summary of results, field data forms and a portion of the preliminary calculation sheets. Volume III contains the remainder of the calculation sheets and summary forms.

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Appendix G. Analytical SO_2

(Analytical SO_2 Preliminary)

(Sequence: ESP-A-(1-10); ESP-B-(1-10); and STK-(1-10))
(Start on pp G-1; G-26; and G-51)
ESP-A-(1-10)

Preliminary FIELD

KENVIRONS, INC.
EPA METHOD 8 LABORATORY
DATA SHEET FOR H_2SO_4 AND SO_2 CONCENTRATION

Client Bechtel Project No. 80019

Run No. BEC ESPA 1 Analysis Date 7/19/80 Analysis by GHR

Barium Chloride Standardization ✓

SAME AS Run BEC-STK-3

ormality of H_2SO_4 Standard: Titration; #1 ____ N, #2 ____ N, #3 ____ N

Milliliters of Standard H_2SO_4 Used: Titration; #1 ____ ml., #2 ____ ml., #3 ____ ml.

illiliters of $BaCl_2$ Titrant Used: Titration; #1 ____ ml., #2 ____ ml., #3 ____ ml.

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

Normality of $BaCl_2$ Titrant equals: Titration; #1 ____, #2 ____, #3 ____

N = $BaCl_2$ Average Normality = 0.0115367 N

Sulfuric Acid Mist Blank

Visual Observations: By: ____

ample No.: ____ Any Noted Sample Loss: ____

olume of 80% Isopropanol Titrated: Titration; #1 ____ ml., #2 ____ ml.

volume of $BaCl_2$ Titrant Used: Titration; #1 ____ ml., #2 ____ ml.

greement of Replicate Titrations (must be within 1% or 0.2 ml.): ____

Vtb = Volume of $BaCl_2$ Titrant Used for the Blank = Average $BaCl_2$ Volume ____ ml.

2

Sulfuric Acid Mist Sample

sual Observations: ________________________ By: ____________

Sample No.; ________________________ Any Noted Sample Loss: ____________

Total Volume of H_2SO_4 Sample (Vsoln) (should contain 250 ml.): ____________ ml.

olume of H_2SO_4 Sample Aliquot (Va) (should be 100 ml.): ____________ ml.

Volume of $BaCl_2$ Titrant Used: Titration; #1 ________ ml., #2 ________ ml.

greement of Replicate Titrations (must be within 1% or 0.2 ml.): ____________

erage Volume of $BaCl_2$ Titrant Used, (Vt): ____________ ml.

K = grams H_2SO_4 per milliequivalent = 0.04904 g/meq
or
lbs. H_2SO_4 per milliequivalent = 1.081×10^{-4} lbs/meq

m(std) = Volume of gas sampled (corrected to standard conditions, from Particulate Calculations and Results Data Sheet) = ____________ dscf

Sulfuric Acid Mist Concentration ($C_{H_2SO_4}$) equals:

$$C_{H_2SO_4} = K \quad \frac{(N_{BaCl_2})(Vt - Vtb)\left(\frac{Vsoln}{Va}\right)}{Vm(std)} \quad =$$

$$C_{H_2SO_4} = \qquad = \text{\_\_\_\_\_\_\_\_\_\_\_\_ lbs/dscf}$$

Sulfur Dioxide Blank

Assume Zero

Visual Observations: ________________________ By: ____________

ample No.: ________________________ Any Noted Sample Loss: ____________

Volume of Hydrogen Peroxide Blank Titrated: Titration; #1 ________ ml., #2 ________ ml.

olume of $BaCl_2$ Titrant Used: Titration; #1 ________ ml., #2 ________ ml.

greement of Replicate titrations (must be within 1% or 0.2 ml.): ____________

Vtb = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: 0.0 ml.

Sulfur Dioxide Sample

Visual Observations: Clear By: CHL

Sample No.: 3016 BEC-ESPA-1 Any Noted Sample Loss: None

Total Volume of SO_2 Sample (Vsoln) (should contain 1,000 ml.): 1000.0 ml.

Volume of SO_2 Sample Aliquot Titrated (Va) (should be 10 ml.): 1.0 ml.

Volume of $BaCl_2$ Titrant Used: Titration; #1 21.3 ml., #2 21.2 ml.

Agreement of Replicate Titrations (must be within 1% or 0.2 ml.): < 0.2

Average Volume of $BaCl_2$ Titrant Used, (Vt): 21.25 ml.

K = grams SO_2 per milliequivalent = 0.03203 g/meq
or
lbs. SO_2 per milliequivalent = 7.061×10^{-5} lb/meq

Vm(std) = Volume of gas sampled (corrected to standard conditions from Particulate Calculations and Results Data Sheet) = ____ dscf

Sulfur Dioxide Concentration (C_{SO_2}) equals:

$$C_{SO_2} = \overset{7.061\times10^{-5}}{K}\ \frac{\overset{0.0115367}{(N_{BaCl_2})}\overset{(21.25-0)}{(V_t - V_{tb})}}{\underset{40.41}{V_{m(std)}}}\left(\frac{V_{soln}}{V_a}\right)\frac{1000}{1} =$$

C_{SO_2} = 4.28368×10^{-4} lbs/dscf

Approved By: ____ Date: ____
Gary H. Revlett, Ph.D.
Analytical Chemist

$\times 6.024 \times 10^{6} =$ 2580 ppm

4

Sulfuric Acid Mist Sample

Visual Observations: By:

Sample No.; ____ Any Noted Sample Loss: ____

Total Volume of H_2SO_4 Sample (Vsoln) (should contain 250 ml.): ____ ml.

Volume of H_2SO_4 Sample Aliquot (Va) (should be 100 ml.): ____ ml.

Volume of $BaCl_2$ Titrant Used: Titration; #1 ____ ml., #2 ____ ml.

Agreement of Replicate Titrations (must be within 1% or 0.2 ml.): ____

Average Volume of $BaCl_2$ Titrant Used, (Vt): ____ ml.

K = grams H_2SO_4 per milliequivalent = 0.04904 g/meq

or

lbs. H_2SO_4 per milliequivalent = 1.081×10^{4} lbs/meq

Vm(std) = Volume of gas sampled (corrected to standard conditions, from Particulate Calculations and Results Data Sheet) = ____ dscf

Sulfuric Acid Mist Concentration ($C_{H_2SO_4}$) equals:

$$C_{H_2SO_4} = K \quad \frac{(N_{BaCl_2})(Vt - Vtb)\left(\frac{Vsoln}{Va}\right)}{Vm(std)} =$$

$C_{H_2SO_4}$ = = ____ lbs/dscf

Sulfur Dioxide Blank

Visual Observations: By:

Sample No.: 3036 Any Noted Sample Loss: ____

Volume of Hydrogen Peroxide Blank Titrated: Titration; #1 10 ml., #2 10 ml

Volume of $BaCl_2$ Titrant Used: Titration; #1 0 ml., #2 0.02 ml.

Agreement of Replicate titrations (must be within 1% or 0.2 ml.): < 0.2

Vtb = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: 0.01 ml.

Sulfuric Acid Mist Sample

Visual Observations: ______ By: ______

Sample No.: ______ Any Noted Sample Loss: ______

Total Volume of H_2SO_4 Sample (Vsoln) (should contain 250 ml.): ______ ml.

Volume of H_2SO_4 Sample Aliquot (Va) (should be 100 ml.): ______ ml.

Volume of $BaCl_2$ Titrant Used: Titration; #1 ______ ml., #2 ______ ml.

Agreement of Replicate Titrations (must be within 1% or 0.2 ml.): ______

Average Volume of $BaCl_2$ Titrant Used, (Vt): ______ ml.

K = grams H_2SO_4 per milliequivalent = 0.04904 g/meq
or
lbs. H_2SO_4 per milliequivalent = 1.081 x 10^4 lbs/meq

Vm(std) = Volume of gas sampled (corrected to standard conditions, from Particulate Calculations and Results Data Sheet) = ______ dscf

Sulfuric Acid Mist Concentration ($C_{H_2SO_4}$) equals:

$$C_{H_2SO_4} = K \quad \frac{(N_{BaCl_2})(Vt - Vtb)\left(\frac{Vsoln}{Va}\right)}{Vm(std)} =$$

$$C_{H_2SO_4} = \qquad = \underline{\qquad\qquad} \text{lbs/dscf}$$

Sulfur Dioxide Blank

Visual Observations: ______ By: ______

Sample No.: 3036 Any Noted Sample Loss: ______

Volume of Hydrogen Peroxide Blank Titrated: Titration; #1 10 ml., #2 10 ml.

Volume of $BaCl_2$ Titrant Used: Titration; #1 0 ml., #2 0.02 ml.

Agreement of Replicate titrations (must be within 1% or 0.2 ml.): < 0.2

Vtb = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: 0.01 ml.

Sulfur Dioxide Sample

Visual Observations: Clear **By:** GHR

Sample No.: 3034 - ESPA -2 **Any Noted Sample Loss:** None

Total Volume of SO_2 Sample (Vsoln) (should contain 1,000 ml.): 1,000.0 ml.

Volume of SO2 Sample Aliquot Titrated (Va) (should be ~~10~~ 1.0 ml.): 1.0 ml.

Volume of $BaCl_2$ Titrant Used: Titration; #1 ~~19.70~~ 20.35 ml., #2 20.40 ml.

Agreement of Replicate Titrations (must be within 1% or 0.2 ml.): < 0.2 ml

Average Volume of $BaCl_2$ Titrant Used, (Vt): 20.375 ml.

K = grams SO2 per milliequivalent = 0.03203 g/meq
or
lbs. SO2 per milliequivalent = 7.061×10^{-5} lb/meq

Vm(std) = Volume of gas sampled (corrected to standard conditions from Particulate Calculations and Results Data Sheet) = ______ dscf

Sulfur Dioxide Concentration (Cso_2) equals:

$$Cso_2 = \overset{7.06\times10^{-5}}{K}\ \frac{(\overset{0.011562}{N_{BaCl_2}})(\overset{20.375}{Vt} - Vtb)}{\underset{42.1423}{Vm(std)}}\left(\frac{Vsoln}{Va}\right)\frac{1000}{1} =$$

Cso_2 = $= 3.94710 \times 10^{-4}$ lbs/dscf

Approved By: ______ Date: ______
Gary H. Revlett, Ph.D.
Analytical Chemist

$\times 6.024 \times 10^6 =$ 2378 ppm

1.

Preliminary field

KENVIRONS, INC.
EPA METHOD 8 LABORATORY
DATA SHEET FOR H_2SO_4 AND SO_2 CONCENTRATION

Client Bechtel Project No. 80019

Run No. BEC-ESPA-3 Analysis Date 7/19/80 Analysis by LHR

Barium Chloride Standardization

Same As BEC-STK-3

Normality of H_2SO_4 Standard: Titration; #1 ______ N, #2 ______ N, #3 ______ N

Milliliters of Standard H_2SO_4 Used: Titration; #1 ______ ml., #2 ______ ml., #3 ______ ml.

Milliliters of $BaCl_2$ Titrant Used: Titration; #1 ______ ml., #2 ______ ml., #3 ______ ml.

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

See STK-3

Normality of $BaCl_2$ Titrant equals: Titration; #1 ______, #2 ______, #3 ______

N = $BaCl_2$ Average Normality = 0.0115367 N

Sulfuric Acid Mist Blank

Visual Observations: ______ By: ______

Sample No.: ______ Any Noted Sample Loss: ______

Volume of 80% Isopropanol Titrated: Titration; #1 ______ ml., #2 ______ ml.

Volume of $BaCl_2$ Titrant Used: Titration; #1 ______ ml., #2 ______ ml.

Agreement of Replicate Titrations (must be within 1% or 0.2 ml.): ______

Vtb = Volume of $BaCl_2$ Titrant Used for the Blank = Average $BaCl_2$ Volume ______ ml.

Sulfuric Acid Mist Sample

Visual Observations: ______________________ **By:** ______________________

Sample No.; ______________________ **Any Noted Sample Loss:** ______________________

Total Volume of H_2SO_4 Sample (Vsoln) (should contain 250 ml.): ______________________ ml.

Volume of H_2SO_4 Sample Aliquot (Va) (should be 100 ml.): ______________________ ml.

Volume of $BaCl_2$ Titrant Used: Titration; #1 ____________ ml., #2 ____________ ml.

Agreement of Replicate Titrations (must be within 1% or 0.2 ml.): ______________________

Average Volume of $BaCl_2$ Titrant Used, (Vt): ______________________ ml.

K = grams H_2SO_4 per milliequivalent = 0.04904 g/meq
or
lbs. H_2SO_4 per milliequivalent = 1.081×10^{4} lbs/meq

Vm(std) = Volume of gas sampled (corrected to standard conditions, from Particulate Calculations and Results Data Sheet) = 43.4172 dscf

Sulfuric Acid Mist Concentration ($C_{H_2SO_4}$) equals:

$$C_{H_2SO_4} = K \frac{(N_{BaCl_2})(Vt - Vtb)\left(\frac{Vsoln}{Va}\right)}{Vm(std)} =$$

$$C_{H_2SO_4} = \qquad = \underline{\qquad\qquad} \text{ lbs/dscf}$$

Sulfur Dioxide Blank

Same As BEc ESP-B-3

Visual Observations: ______________________ **By:** ______________________

Sample No.: ______________________ **Any Noted Sample Loss:** ______________________

Volume of Hydrogen Peroxide Blank Titrated: Titration; #1 ____________ ml., #2 ____________ ml.

Volume of $BaCl_2$ Titrant Used: Titration; #1 ____________ ml., #2 ____________ ml.

Agreement of Replicate titrations (must be within 1% or 0.2 ml.): ______________________

Vtb = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: 0.06 ml.

Sulfur Dioxide Sample

Visual Observations: Clear **By:** GAF

Sample No.: 3048 BEC-ESPA-3 **Any Noted Sample Loss:** None

Total Volume of SO_2 Sample (Vsoln) (should contain 1,000 ml.): 1000.0 ml

Volume of SO_2 Sample Aliquot Titrated (Va) (should be 10 ml.): 1.0 ml

Volume of $BaCl_2$ Titrant Used: **Titration; #1** 22.30 **ml., #2** 22.35 ml

Agreement of Replicate Titrations (must be within 1% or 0.2 ml.): < 0.2 ml

Average Volume of $BaCl_2$ Titrant Used, (Vt): 22.325 ml

K = grams SO_2 per milliequivalent = 0.03203 g/meq
or
lbs. SO_2 per milliequivalent = 7.061×10^{-5} lb/meq

Vm(std) = Volume of gas sampled (corrected to standard conditions from Particulate Calculations and Results Data Sheet) = ______ **dscf**

Sulfur Dioxide Concentration (C_{SO_2}) equals:

$$C_{SO_2} = \overset{7.061\times10^{-5}}{K}\ \frac{\overset{0.0115367}{(N_{BaCl_2})}\overset{(22.325-0.06)}{(V_t - V_{tb})}\left(\frac{V_{soln}}{V_a}\right)\frac{1000}{1}}{\underset{43.4172}{V_{m(std)}}} =$$

$$C_{SO_2} = \qquad = 4.1774\times10^{-4} \text{ lbs/dscf}$$

Approved By: ______ **Date:** ______
Gary H. Revlett, Ph.D.
Analytical Chemist

$\times 6.024\times10^{6} =$ 2516 ppm

10

Preliminary

KENVIRONS, INC.
EPA METHOD 8 LABORATORY
DATA SHEET FOR H_2SO_4 AND SO_2 CONCENTRATION

Client Bechtel Project No. 80019
Run No. ESP-A-4 Analysis Date 7/20/80 Analysis by DAB/GHE

Barium Chloride Standardization

Same as Bec-Stk-4

Normality of H_2SO_4 Standard:	Titration; #1 ____ N,	#2 ____ N,	#3 ____ N
Milliliters of Standard H_2SO_4 Used:	Titration; #1 ____ ml,	#2 ____ ml,	#3 ____ ml
Milliliters of $BaCl_2$ Titrant Used:	Titration; #1 ____ ml,	#2 ____ ml,	#3 ____ ml

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

Normality of $BaCl_2$ Titrant equals: Titration; #1 ____, #2 ____, #3 ____

N = $BaCl_2$ Average Normality = 0.011502 N

Sulfuric Acid Mist Blank

Visual Observations: By:

Sample No.: ____ Any Noted Sample Loss: ____

Volume of 80% Isopropanol Titrated: Titration; #1 ____ ml, #2 ____ ml

Volume of $BaCl_2$ Titrant Used: Titration; #1 ____ ml, #2 ____ ml

Agreement of Replicate Titrations (must be within 1% or 0.2 ml.): ____

Vtb = Volume of $BaCl_2$ Titrant Used for the Blank = Average $BaCl_2$ Volume ____ ml

Sulfuric Acid Mist Sample

Visual Observations: **By:**

Sample No.: ______ **Any Noted Sample Loss:** ______

Total Volume of H_2SO_4 Sample (Vsoln) (should contain 250 ml.): ______ **ml.**

Volume of H_2SO_4 Sample Aliquot (Va) (should be 100 ml.): ______ **ml.**

Volume of $BaCl_2$ Titrant Used: **Titration; #1** ______ **ml., #2** ______ **ml.**

Agreement of Replicate Titrations (must be within 1% or 0.2 ml.): ______

Average Volume of $BaCl_2$ Titrant Used, (Vt): ______ **ml.**

K = grams H_2SO_4 per milliequivalent = 0.04904 g/meq
or
lbs. H_2SO_4 per milliequivalent = 1.081×10^{4} lbs/meq

Vm(std) = Volume of gas sampled (corrected to standard conditions, from Particulate Calculations and Results Data Sheet) = ______ **dscf**

Sulfuric Acid Mist Concentration ($C_{H_2SO_4}$) equals:

$$C_{H_2SO_4} = K \quad \frac{(N_{BaCl_2})(V_t - V_{tb})\left(\frac{V_{soln}}{V_a}\right)}{V_{m(std)}} \quad =$$

$$C_{H_2SO_4} = \qquad\qquad = \underline{\hspace{3cm}} \text{ lbs/dscf}$$

Sulfur Dioxide Blank

Visual Observations: **By:** DAB

Sample No.: 3066 **Any Noted Sample Loss:** NO

Volume of Hydrogen Peroxide Blank Titrated: **Titration; #1** 1 **ml., #2** 1 **ml.**

Volume of $BaCl_2$ Titrant Used: **Titration; #1** 0 **ml., #2** 0 **ml.**

Agreement of Replicate titrations (must be within 1% or 0.2 ml.): < 0.2 ml

Vtb = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: 0.0 **ml.**

Sulfur Dioxide Sample

Visual Observations: Clear By: GHR

Sample No.: 3063 (ESP-A-4) Any Noted Sample Loss: None

Total Volume of SO_2 Sample (Vsoln) (should contain 1,000 ml.): 1000.0 m

Volume of SO2 Sample Aliquot Titrated (Va) (should be 10 ml.): 1.0 m

Volume of $BaCl_2$ Titrant Used: Titration; #1 23.15 ml., #2 23.18 m

Agreement of Replicate Titrations (must be within 1% or 0.2 ml.): < 0.2

Average Volume of $BaCl_2$ Titrant Used, (Vt): ______ m

K = grams SO2 per milliequivalent = 0.03203 g/meq
or
lbs. SO2 per milliequivalent = 7.061×10^{-5} lb/meq

Vm(std) = Volume of gas sampled (corrected to standard conditions from Particulate Calculations and Results Data Sheet) = 41.7637 dscf

Sulfur Dioxide Concentration (Cso_2) equals:

$$Cso_2 = \overset{7.061\times10^{-5}}{K}\ \frac{\overset{0.011502}{(N_{BaCl_2})}\overset{(23.175-0)}{(Vt - Vtb)}}{\underset{41.7637}{Vm(std)}}\left(\frac{Vsoln}{Va}\right)\frac{1000}{1} =$$

Cso_2 = = 4.5067×10^{-4} lbs/dscf

Approved By: ______ Date: ______
Gary H. Revlett, Ph.D.
Analytical Chemist

$\times 6.024 \times 10^6$ 2714 ppm

Preliminary FIELD

KENVIRONS, INC.
EPA METHOD 8 LABORATORY
DATA SHEET FOR H_2SO_4 AND SO_2 CONCENTRATION

Client Bechtel Project No. 80019

Run No. BEC-ESPA-5 3081 Analysis Date 7/21/80 Analysis by GHR

Barium Chloride Standardization

Same As Run BEC-STK5

Normality of H_2SO_4 Standard: Titration; #1 ______ N, #2 ______ N, #3 ______ N

Milliliters of Standard H_2SO_4 Used: Titration; #1 ______ ml., #2 ______ ml., #3 ______ ml.

Milliliters of $BaCl_2$ Titrant Used: Titration; #1 ______ ml., #2 ______ ml., #3 ______ ml.

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

Normality of $BaCl_2$ Titrant equals: Titration; #1 ______, #2 ______, #3 ______.

N = $BaCl_2$ Average Normality = 0.01146 N

Sulfuric Acid Mist Blank

Visual Observations: ______ By: ______

Sample No.: ______ Any Noted Sample Loss: ______

Volume of 80% Isopropanol Titrated: Titration; #1 ______ ml., #2 ______ ml.

Volume of $BaCl_2$ Titrant Used: Titration; #1 ______ ml., #2 ______ ml.

Agreement of Replicate Titrations (must be within 1% or 0.2 ml.): ______

Vtb = Volume of $BaCl_2$ Titrant Used for the Blank = Average $BaCl_2$ Volume ______ ml.

Sulfuric Acid Mist Sample

Visual Observations: By:

Sample No.: Any Noted Sample Loss:

Total Volume of H_2SO_4 Sample (Vsoln) (should contain 250 ml.): ml.

Volume of H_2SO_4 Sample Aliquot (Va) (should be 100 ml.): ml.

Volume of $BaCl_2$ Titrant Used: Titration; #1 ml., #2 ml.

Agreement of Replicate Titrations (must be within 1% or 0.2 ml.):

Average Volume of $BaCl_2$ Titrant Used, (Vt): ml.

K = grams H_2SO_4 per milliequivalent = 0.04904 g/meq
or
lbs. H_2SO_4 per milliequivalent = 1.081 x 10^4 lbs/meq

Vm(std) = Volume of gas sampled (corrected to standard conditions, from Particulate Calculations and Results Data Sheet) = 43.5003 dscf

Sulfuric Acid Mist Concentration ($C_{H_2SO_4}$) equals:

$$C_{H_2SO_4} = K \quad \frac{(N_{BaCl_2})(Vt - Vtb)\left(\frac{Vsoln}{Va}\right)}{Vm(std)} =$$

$$C_{H_2SO_4} = \qquad = \_\_\_\_\_\_ \text{ lbs/dscf}$$

Sulfur Dioxide Blank

Visual Observations: Clear By:

Sample No.: 3083 (12% H_2O_2 Blank) Any Noted Sample Loss: None

Volume of Hydrogen Peroxide Blank Titrated: Titration; #1 1.0 ml., #2 1.0 ml.

Volume of $BaCl_2$ Titrant Used: Titration; #1 0.0 ml., #2 0.0 ml.

Agreement of Replicate titrations (must be within 1% or 0.2 ml.): <0.2

Vtb = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: 0.0 ml.

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Sulfur Dioxide Sample

Visual Observations: Clear By: B Ar

Sample No.: 3081 BEC - ESP - A - 3 Any Noted Sample Loss: None

Total Volume of SO_2 Sample (Vsoln) (should contain 1,000 ml.): 1000.0 ml.

Volume of SO_2 Sample Aliquot Titrated (Va) (should be 10 ml.): 1.0 ml.

Volume of $BaCl_2$ Titrant Used: Titration; #1 23.18 ml., #2 23.05 ml.

Agreement of Replicate Titrations (must be within 1% or 0.2 ml.): < 0.2

Average Volume of $BaCl_2$ Titrant Used, (Vt): 23.115 ml.

K = grams SO_2 per milliequivalent = 0.03203 g/meq
or
lbs. SO_2 per milliequivalent = 7.061×10^{-5} lb/meq

Vm(std) = Volume of gas sampled (corrected to standard conditions from Particulate Calculations and Results Data Sheet) = 43.5005 dscf

Sulfur Dioxide Concentration (C_{SO_2}) equals:

$$C_{SO_2} = K \frac{(N_{BaCl_2})(Vt - Vtb)\left(\frac{Vsoln}{Va}\right)}{Vm(std)} = 2590.2 \text{ ppm}$$

$$C_{SO_2} \frac{(7.061 \times 10^{-5})(23.115)(0.01146)(1000)}{43.505} = 4.2998 \times 10^{-4} \text{ lbs/dscf}$$

Approved By: ______________ Date: __________
Gary H. Revlett, Ph.D.
Analytical Chemist

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Preliminary FIELD

KENVIRONS, INC.
EPA METHOD 6 LABORATORY
DATA SHEET FOR SO_2 CONCENTRATION

Client Bechtel Project No. 80019

Run No. BEC-ESPA-6 Analysis Date 7/22/80 Analysis by GHA

Barium Chloride Standardization

Same As Run BEC-STL-6

Normality of H_2SO_4 Standard: Titration; #1 ____ N, #2 ____ N, #3 ____

Milliliters of Standard H_2SO_4 Used: Titration; #1 ____ ml., #2 ____ ml., #3 ____

Milliliters of $BaCl_2$ Titrant Used: Titration; #1 ____ ml., #2 ____ ml., #3 ____

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

Normality of $BaCl_2$ Titrant equals: Titration; #1 ____, #2 ____, #3 ____

N = $BaCl_2$ Average Normality = 0.0115245 N

Sulfur Dioxide Blank

Visual Observations: Clear By: GHA

Sample No.: 3095 (12% H_2O_2 Blank) Any Noted Sample Loss: None

Volume of Hydrogen Peroxide Blank Titrated: Titration; #1 1.0 ml., #2 1.0

Volume of $BaCl_2$ Titrant Used: Titration; #1 0.0 ml., #2 0.0

Agreement of Replicate titrations (must be within 1% or 0.2 ml.): < 0.2

Vtb = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: 0.0

Sulfur Dioxide Sample

Visual Observations: Clear By: GHR

Sample No.: 3089 (BEC-ESPA-6) Any Noted Sample Loss: None

Total Volume of SO_2 Sample (Vsoln) (should contain 1000 ml.): 1000.0

Volume of SO_2 Sample Aliquot Titrated (Va) (should be 20 ml.): 1.0

Volume of $BaCl_2$ Titrant Used: Titration; #1 23.10 ml., #2 23.20

Agreement of Replicate Titrations (must be within 1% or 0.2 ml.): <0.20

Average Volume of $BaCl_2$ Titrant Used, (Vt): 23.15

K_2 = grams SO_2 per milliequivalent = 0.03203 g/meq
or
lbs. SO_2 per milliequivalent = 7.061×10^{-5} lb/meq

Vm(std) = Volume of gas sampled (corrected to standard conditions from Method 6 Field Form =

Sulfur Dioxide Concentration (C_{SO_2}) equals:

$$C_{SO_2} = \overset{7.061\times10^{-5}}{K_2}\ \frac{\overset{0.0115245}{(N_{BaCl_2})}\overset{(23.15-0)}{(V_t - V_{tb})}}{\underset{43.3592}{V_{m(std)}}}\left(\frac{V_{soln}}{V_a}\right)\frac{1000}{1} =$$

C_{SO_2} = 4.34468×10^{-4} lbs/

Approved By: Date:
Gary H. Revlett, Ph.D.
Analytical Chemist

$\times 6.024 \times 10^6 = 2617$ ppm

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Preliminary FIELD

~~KENVIRONS,~~ INC.
EPA METHOD 6 LABORATORY
DATA SHEET FOR SO_2 CONCENTRATION

Client Bechtel Project No. 80019

Run No. BEC-ESPA-7 Analysis Date 7/23/80 Analysis by GHK

Barium Chloride Standardization

Same As Run BEC-STK-7

Normality of H_2SO_4 Standard: Titration; #1 ____ N, #2 ____ N, #3 ____

Milliliters of Standard H_2SO_4 Used: Titration; #1 ____ ml., #2 ____ ml., #3 ____

Milliliters of $BaCl_2$ Titrant Used: Titration; #1 ____ ml., #2 ____ ml., #3 ____

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

Normality of $BaCl_2$ Titrant equals: Titration; #1 ____, #2 ____, #3 ____

N = $BaCl_2$ Average Normality = 0.01155 N

Sulfur Dioxide Blank

Visual Observations: Clear By: GHK

Sample No.: 3113 (12% H_2O_2 Blank) Any Noted Sample Loss: None

Volume of Hydrogen Peroxide Blank Titrated: Titration; #1 1.0 ml., #2 1.0

Volume of $BaCl_2$ Titrant Used: Titration; #1 0.0 ml., #2 0.0

Agreement of Replicate titrations (must be within 1% or 0.2 ml.): < 0.2ml

Vtb = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: 0.0

Sulfur Dioxide Sample

Visual Observations: Clear By: GAR

Sample No.: 3/06 Any Noted Sample Loss: None

Total Volume of SO2 Sample (Vsoln) (should contain 1000 ml.): 1000.0

Volume of SO2 Sample Aliquot Titrated (Va) (should be $\overset{10.}{20}$ ml.): 1.0

Volume of BaCl2 Titrant Used: Titration; #1 19.70 ml., #2 19.72

Agreement of Replicate Titrations (must be within 1% or 0.2 ml.): <0.2ml

Average Volume of BaCl2 Titrant Used, (Vt): 19.71

K_2 = grams SO_2 per milliequivalent = 0.03203 g/meq

or

lbs. SO_2 per milliequivalent = 7.061×10^{-5} lb/meq

Vm(std) = Volume of gas sampled (corrected to standard conditions from Method 6 Field Form = 40.58

Sulfur Dioxide Concentration (C_{SO_2}) equals:

$$C_{SO_2} = K_2 \frac{(N_{BaCl_2})(V_t - V_{tb})}{V_{m(std)}} \left(\frac{V_{soln}}{V_a}\right) =$$

$$C_{SO_2} = \frac{7.061 \times 10^{-5} (0.01155)(19.71) \frac{1000}{1}}{40.58} = 3.9612 \times 10^{-4} \text{ lbs/c}$$

Approved By: ________ Date: ________
Gary H. Revlett, Ph.D.
Analytical Chemist

$C_{SO_2} (6.024 \times 10^{6}) = 2386$ ppm a2

Preliminary FIELD

KENVIRONS, INC.
EPA METHOD 6 LABORATORY
DATA SHEET FOR SO_2 CONCENTRATION

Client: Bechtel   Project No. 80019

Run No. BEC-ESPA-8 Analysis Date 7/24/80 Analysis by ____

Barium Chloride Standardization

SAME AS RUN No. BEC-STK-8

Normality of H_2SO_4 Standard: Titration; #1 ____ N, #2 ____ N, #3 ____

Milliliters of Standard H_2SO_4 Used: Titration; #1 ____ ml., #2 ____ ml., #3 ____

Milliliters of $BaCl_2$ Titrant Used: Titration; #1 ____ ml., #2 ____ ml., #3 ____

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

Normality of $BaCl_2$ Titrant equals: Titration; #1 ____, #2 ____, #3 ____

N = $BaCl_2$ Average Normality = ____ N

Sulfur Dioxide Blank

Visual Observations: Clear   By: GHR

Sample No.: 3113 (H_2O_2 Blank)   Any Noted Sample Loss: None

Volume of Hydrogen Peroxide Blank Titrated: Titration; #1 1.0 ml., #2 1.0

Volume of $BaCl_2$ Titrant Used: Titration; #1 0.0 ml., #2 0.0

Agreement of Replicate titrations (must be within 1% or 0.2 ml.): <0.2 ml

tb = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: 0.0

21.

Sulfur Dioxide Sample

Visual Observations: Clear By: GHR

ample No.: 3/21 (BEC-ESPA-8) Any Noted Sample Loss: None

otal Volume of SO_2 Sample (Vsoln) (should contain 1000 ml.): 1000 ml

olume of SO_2 Sample Aliquot Titrated (Va) (should be 20 ml.): 1.0

Volume of $BaCl_2$ Titrant Used: Titration; #1 20.66 ml., #2 20.72

greement of Replicate Titrations (must be within 1% or 0.2 ml.): < 0.2 ml

verage Volume of $BaCl_2$ Titrant Used, (Vt): 20.66

K_2 = grams SO_2 per milliequivalent = 0.03203 g/meq
or
lbs. SO_2 per milliequivalent = 7.061×10^{-5} lb/meq

m(std) = Volume of gas sampled (corrected to standard conditions from Method 6 Field Form =

Sulfur Dioxide Concentration (C_{SO_2}) equals:

$$C_{SO_2} = \overset{7.061\times10^{-5}}{K_2}\ \frac{(\overset{0.049345}{N_{BaCl_2}})\overset{(20.66-0)}{(Vt - Vtb)}}{\underset{43.1414}{Vm(std)}} \left(\frac{Vsoln}{Va}\right) \frac{1000}{1} =$$

C_{SO_2} = = 4.0356×10^{-5} lbs/c

Approved By: Date:
Gary H. Revlett, Ph.D.
Analytical Chemist

$\times\ 6.024\times10^{6}$ = 2431 ppm

2-2

Preliminary FIELD

KENVIRONS, INC.
EPA METHOD [illegible] LABORATORY
DATA SHEET FOR SO_2 CONCENTRATION

Client Bechtel Project No. 80019

Run No. BEC-ESP-A-9 Analysis Date 7/25/80 Analysis by GHR

Barium Chloride Standardization

Same As Run No. BEC-STK-9.

Normality of H_2SO_4 Standard: Titration; #1 ____ N, #2 ____ N, #3 ____

Milliliters of Standard H_2SO_4 Used: Titration; #1 ____ ml., #2 ____ ml., #3 ____

Milliliters of $BaCl_2$ Titrant Used: Titration; #1 ____ ml., #2 ____ ml., #3 ____

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

ormality of $BaCl_2$ Titrant equals: Titration; #1 ____, #2 ____, #3 ____

N = $BaCl_2$ Average Normality = 0.0101488 N

Sulfur Dioxide Blank

isual Observations: Clear By: GHR

ample No.: 3141 (12% H_2O_2 Blank) Any Noted Sample Loss: None

volume of Hydrogen Peroxide Blank Titrated: Titration; #1 1.0 ml., #2 1.0

olume of $BaCl_2$ Titrant Used: Titration; #1 0.0 ml., #2 0.0

Agreement of Replicate titrations (must be within 1% or 0.2 ml.): < 0.2 ml

tb = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: 0.0

Sulfur Dioxide Sample

Visual Observations: Clear By: GHR

Sample No.: 3131 (BEC-ESP-A-9) Any Noted Sample Loss: None

Total Volume of SO_2 Sample (Vsoln) (should contain 1000.0 ml.): 1000.0

Volume of SO_2 Sample Aliquot Titrated (Va) (should be ~~20~~ 100 ml.): 1.0

Volume of $BaCl_2$ Titrant Used: Titration; #1 24.58 ml., #2 24.44

Agreement of Replicate Titrations (must be within 1% or 0.2 ml.): <0.2 ml

Average Volume of $BaCl_2$ Titrant Used, (Vt): 24.51

K_2 = grams SO_2 per milliequivalent = 0.03203 g/meq

or

lbs. SO_2 per milliequivalent = 7.061×10^{-5} lb/meq

V (std) = Volume of gas sampled (corrected to standard conditions from Method 6 Field Form

=

Sulfur Dioxide Concentration (C_{SO_2}) equals:

$$C_{SO_2} = \overset{7.061\times10^{-5}}{K_2} \frac{\overset{0.0101498}{(N_{BaCl_2})}\overset{(24.51-0)}{(Vt - Vtb)}}{\underset{41.9873}{Vm(std)}} \left(\frac{Vsoln}{Va}\right)\frac{1000}{1} = 4.183177\times10^{-4}$$

C_{SO_2} = = 4.183177 lbs

Approved By: Date:

Gary H. Revlett, Ph.D.
Analytical Chemist

$\times\ 6.024 \times 10^{6} =$ 2520 ppm

A2

Preliminary FIELD

~~KENVIRONS, INC.~~

EPA METHOD 6 LABORATORY

DATA SHEET FOR SO_2 CONCENTRATION

Client Bechtel Project No. 80019

Run No. BEC-ESPA-10 Analysis Date 7/26/80 Analysis by GHR

Barium Chloride Standardization

Same As Run No. BEC-STA-10

Normality of H_2SO_4 Standard: Titration; #1 ____ N, #2 ____ N, #3 __

Milliliters of Standard H_2SO_4 Used: Titration; #1 ____ ml., #2 ____ ml., #3 __

Milliliters of $BaCl_2$ Titrant Used: Titration; #1 ____ ml., #2 ____ ml., #3 __

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

Normality of $BaCl_2$ Titrant equals: Titration; #1 ____, #2 ____, #3 __

N = $BaCl_2$ Average Normality = .01012 N

Sulfur Dioxide Blank

Visual Observations: Clear By: GAR

Sample No.: 3048 (12% H_2O_2 Blank) Any Noted Sample Loss: None

Volume of Hydrogen Peroxide Blank Titrated: Titration; #1 1.0 ml., #2 1.0

Volume of $BaCl_2$ Titrant Used: Titration; #1 0.04 ml., #2 0.0

Agreement of Replicate titrations (must be within 1% or 0.2 ml.): < 0.2 ml

Vtb = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: 0.04

Sulfur Dioxide Sample

Visual Observations: Clear By: GAF

Sample No.: 3148 (BEC-BP-A-10 Any Noted Sample Loss: None

Total Volume of SO_2 Sample (Vsoln) (should contain 1000 ml.): 1000.0

Volume of SO2 Sample Aliquot Titrated (Va) (should be 20 ml.): 1.0

Volume of $BaCl_2$ Titrant Used: Titration; #1 23.08 ml., #2 22.95

Agreement of Replicate Titrations (must be within 1% or 0.2 ml.): < 0.2

Average Volume of $BaCl_2$ Titrant Used, (Vt): 23.015

K_2 = grams SO2 per milliequivalent = 0.03203 g/meq
or
lbs. SO2 per milliequivalent = 7.061×10^{-5} lb/meq

m(std) = Volume of gas sampled (corrected to standard conditions from Method 6 Fiel
Form
=

Sulfur Dioxide Concentration (C_{SO_2}) equals:

$$C_{SO2} = K_2 \frac{(N_{BaCl_2})(Vt - Vtb)}{Vm(std)} \left(\frac{Vsoln}{Va}\right) =$$

$$C_{SO2} = 7.061 \times 10^{-5} \frac{(.01012)(23.015 - .04)}{41.1761} \left(\frac{1000}{1.0}\right) = 3.99 \times 10^{-4} \text{ lt}$$

Approved By: ______ Date: ______
Gary H. Revlett, Ph.D.
Analytical Chemist

$3.99 \times 10^{-4} \times 6.024 \times 10^{6} = 2403.6$ ppm

ESP-B-(1-10)

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Preliminary

KENVIRONS, INC.
EPA METHOD 8 LABORATORY
DATA SHEET FOR H_2SO_4 AND SO_2 CONCENTRATION

Client Bechtel Project No. 90019

Run No. BEC-ESPB- Analysis Date 7/18/90 Analysis by GHR

==========

Barium Chloride Standardization

Normality of H_2SO_4 Standard: Titration; #1 0.0102 N, #2 0.0102 N, #3 0.0102 N

Milliliters of Standard H_2SO_4 Used: Titration; #1 25.0 ml., #2 25.0 ml., #3 25.0 ml.

Milliliters of $BaCl_2$ Titrant Used: Titration; #1 21.94 ml., #2 21.92 ml., #3 22.06 ml.

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality } \overset{0.0102}{\text{of}}\ H_2SO_4 \times \text{ml. } \overset{25}{\text{of}}\ H_2SO_4}{\text{ml. } \underset{22}{\text{of}}\ BaCl_2}$$

Normality of $BaCl_2$ Titrant equals: Titration; #1 ______, #2 ______, #3 ______

N = $BaCl_2$ Average Normality = 0.0115909 N

==========

Sulfuric Acid Mist Blank

Visual Observations: By:

Sample No.: ______ Any Noted Sample Loss: ______

Volume of 80% Isopropanol Titrated: Titration; #1 ______ ml, #2 ______ ml

Volume of $BaCl_2$ Titrant Used: Titration; #1 ______ ml, #2 ______ ml

Agreement of Replicate Titrations (must be within 1% or 0.2 ml.): ______

Vtb = Volume of $BaCl_2$ Titrant Used for the Blank = Average $BaCl_2$ Volume ______ ml

==========

Sulfuric Acid Mist Sample

Visual Observations: ______________________ By: ______________

Sample No.; ______________________ Any Noted Sample Loss: ______________

Total Volume of H_2SO_4 Sample (Vsoln) (should contain 250 ml.): ______________ ml.

Volume of H_2SO_4 Sample Aliquot (Va) (should be 100 ml.): ______________ ml.

Volume of $BaCl_2$ Titrant Used: Titration; #1 __________ ml., #2 __________ ml.

Agreement of Replicate Titrations (must be within 1% or 0.2 ml.): ______________

Average Volume of $BaCl_2$ Titrant Used, (Vt): ______________ ml.

K = grams H_2SO_4 per milliequivalent = 0.04904 g/meq
or
lbs. H_2SO_4 per milliequivalent = 1.081×10^{4} lbs/meq

Vm(std) = Volume of gas sampled (corrected to standard conditions, from Particulate Calculations and Results Data Sheet) = ______________ dscf

Sulfuric Acid Mist Concentration ($C_{H_2SO_4}$) equals:

$$C_{H_2SO_4} = K \frac{(N_{BaCl_2})(V_t - V_{tb})\left(\frac{V_{soln}}{V_a}\right)}{V_{m(std)}} =$$

$C_{H_2SO_4}$ = ______________ = ______________ lbs/dscf

Sulfur Dioxide Blank

Visual Observations: ______________________ By: ______________

Sample No.: ______________________ Any Noted Sample Loss: ______________

Volume of Hydrogen Peroxide Blank Titrated: Titration; #1 __________ ml., #2 __________ ml.

Volume of $BaCl_2$ Titrant Used: Titration; #1 __________ ml., #2 __________ ml.

Agreement of Replicate titrations (must be within 1% or 0.2 ml.): Assume Zero

Vtb = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: 0.0 ml.

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Sulfur Dioxide Sample

Visual Observations: Clear **By:** GHF

Sample No.: BEC-ESP-B-1 **Any Noted Sample Loss:** None

Total Volume of SO_2 Sample (Vsoln) (should contain 1,000 ml.): 1000 ml

Volume of SO_2 Sample Aliquot Titrated (Va) (should be 10 ml.): 10 ml

Volume of $BaCl_2$ Titrant Used: **Titration; #1** 247.5 **ml., #2** 248.5 ml

Agreement of Replicate Titrations (must be within 1% or 0.2 ml.): ______

Average Volume of $BaCl_2$ Titrant Used, (Vt): 248 ml

K = grams SO_2 per milliequivalent = 0.03203 g/meq
or
lbs. SO_2 per milliequivalent = 7.061×10^{-5} lb/meq

Vm(std) = Volume of gas sampled (corrected to standard conditions from Particulate Calculations and Results Data Sheet) = ______ dscf

Sulfur Dioxide Concentration (C_{SO_2}) equals:

$$C_{SO_2} = \overset{7.061\times10^{-5}}{K}\ \frac{\overset{0.0115909}{(N_{BaCl_2})}\overset{(248-0)}{(V_t - V_{tb})}\left(\frac{V_{soln}}{V_a}\right)^{\frac{1000}{10}}}{\underset{45.07}{V_{m(std)}}} =$$

C_{SO_2} = = 4.503×10^{-4} lbs/dscf

Approved By: ______ **Date:** ______
Gary H. Revlett, Ph.D.
Analytical Chemist

$\times 6.024 \times 10^{6}$ = 2713 ppm prel.

Preliminary file

KENVIRONS, INC.
EPA METHOD 8 LABORATORY
DATA SHEET FOR H_2SO_4 AND SO_2 CONCENTRATION

Client Bechtel Project No. 80019

Run No BEC-ESPB-2 Analysis Date 7/18/80 Analysis by GHe

==

Barium Chloride Standardization

Same BEC-STK-2

Normality of H_2SO_4 Standard: Titration; #1 ______ N, #2 ______ N, #3 ______ N

Milliliters of Standard H_2SO_4 Used: Titration; #1 ______ ml, #2 ______ ml, #3 ______ ml.

Milliliters of $BaCl_2$ Titrant Used: Titration; #1 ______ ml, #2 ______ ml, #3 ______ ml.

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

Normality of $BaCl_2$ Titrant equals: Titration; #1 ______, #2 ______, #3 ______

N = $BaCl_2$ Average Normality = 0.011562 N

==

Sulfuric Acid Mist Blank

Visual Observations: By:

Sample No.: ______ Any Noted Sample Loss: ______

Volume of 80% Isopropanol Titrated: Titration; #1 ______ ml, #2 ______ ml.

Volume of $BaCl_2$ Titrant Used: Titration; #1 ______ ml, #2 ______ ml.

Agreement of Replicate Titrations (must be within 1% or 0.2 ml.): ______

Vtb = Volume of $BaCl_2$ Titrant Used for the Blank = Average $BaCl_2$ Volume ______ ml.

==

Sulfuric Acid Mist Sample

Visual Observations: By:

Sample No.; ____________________ Any Noted Sample Loss: ____________

Total Volume of H_2SO_4 Sample (Vsoln) (should contain 250 ml.): ____________ ml.

Volume of H_2SO_4 Sample Aliquot (Va) (should be 100 ml.): ____________ ml.

Volume of $BaCl_2$ Titrant Used: Titration; #1 ________ ml., #2 ________ ml.

Agreement of Replicate Titrations (must be within 1% or 0.2 ml.): ____________

Average Volume of $BaCl_2$ Titrant Used, (Vt): ____________

K = grams H_2SO_4 per milliequivalent = 0.04904 g/meq
or
lbs. H_2SO_4 per milliequivalent = 1.081×10^{-4} lbs/meq

Vm(std) = Volume of gas sampled (corrected to standard conditions, from Particulate Calculations and Results Data Sheet) = ____________ dscf

Sulfuric Acid Mist Concentration ($C_{H_2SO_4}$) equals:

$$C_{H_2SO_4} = K \quad \frac{(N_{BaCl_2})(Vt - Vtb)\left(\frac{Vsoln}{Va}\right)}{Vm(std)} =$$

$$C_{H_2SO_4} = \qquad = \_\_\_\_\_\_\_\_ \text{ lbs/dscf}$$

Sulfur Dioxide Blank

Same as BEC-ESP-A-2

Visual Observations: By:

Sample No.: ____________________ Any Noted Sample Loss: ____________

Volume of Hydrogen Peroxide Blank Titrated: Titration; #1 ________ ml., #2 ________ ml.

Volume of $BaCl_2$ Titrant Used: Titration; #1 ________ ml., #2 ________ ml.

Agreement of Replicate titrations (must be within 1% or 0.2 ml.): ____________

Vtb = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: 0.01 ml.

18

Sulfur Dioxide Sample

Visual Observations: Clear **By:** GKe

Sample No.: 3035 **Any Noted Sample Loss:** None

Total Volume of SO_2 Sample (Vsoln) (should contain 1,000 ml.): 1000.0 ml.

Volume of SO_2 Sample Aliquot Titrated (Va) (should be 10 ml.): 1.0 ml.

Volume of $BaCl_2$ Titrant Used: Titration; #1 21.6 ml., #2 21.5 ml.

Agreement of Replicate Titrations (must be within 1% or 0.2 ml.): < 0.2

Average Volume of $BaCl_2$ Titrant Used, (Vt): 21.55 ml.

K = grams SO_2 per milliequivalent = 0.03203 g/meq
or
lbs. SO_2 per milliequivalent = 7.061×10^{-5} lb/meq

Vm(std) = Volume of gas sampled (corrected to standard conditions from Particulate Calculations and Results Data Sheet) = ______ dscf

---

Sulfur Dioxide Concentration (C_{SO_2}) equals:

$$C_{SO_2} = \overset{7.061\times10^{-5}}{K}\ \frac{\overset{0.011562}{(N_{BaCl_2})}\overset{(21.55-0.01)}{(V_t - V_{tb})}\left(\frac{V_{soln}}{V_a}\right)^{\frac{1000}{1}}}{\underset{47.82}{V_m(std)}} =$$

C_{SO_2} = = 4.1067×10^{-4} lbs/dscf

Approved By: ______ Date: ______
Gary H. Revlett, Ph.D.
Analytical Chemist

$\times\ 6.024 \times 10^{6}$ = 2474 ppm

2c

Preliminary FC-0

KENVIRONS, INC.
EPA METHOD 8 LABORATORY
DATA SHEET FOR H_2SO_4 AND SO_2 CONCENTRATION

Client Bechtel Project No. 80019

Run No. BEC-ESPB-3 Analysis Date 7/17/80 Analysis by GHe

Barium Chloride Standardization

Same As Run BEC-STK-3

Normality of H_2SO_4 Standard: Titration; #1 ______N, #2 ______N, #3 ______N

Milliliters of Standard H_2SO_4 Used: Titration; #1 ______ml, #2 ______ml, #3 ______ml.

Milliliters of $BaCl_2$ Titrant Used: Titration; #1 ______ml, #2 ______ml, #3 ______ml.

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

Normality of $BaCl_2$ Titrant equals: Titration; #1 ______, #2 ______, #3 ______

N = $BaCl_2$ Average Normality = 0.0115367 N

same as STK 3

Sulfuric Acid Mist Blank

Visual Observations: • By:

Sample No.: ______ Any Noted Sample Loss: ______

Volume of 80% Isopropanol Titrated: Titration; #1 ______ml, #2 ______ml.

Volume of $BaCl_2$ Titrant Used: Titration; #1 ______ml, #2 ______ml.

Agreement of Replicate Titrations (must be within 1% or 0.2 ml.): ______

Vtb = Volume of $BaCl_2$ Titrant Used for the Blank = Average $BaCl_2$ Volume ______ml.

Sulfuric Acid Mist Sample

Visual Observations: By:

Sample No.: ______ Any Noted Sample Loss: ______

Total Volume of H_2SO_4 Sample (Vsoln) (should contain 250 ml.): ______ ml.

Volume of H_2SO_4 Sample Aliquot (Va) (should be 100 ml.): ______ ml.

Volume of $BaCl_2$ Titrant Used: Titration; #1 ______ ml., #2 ______ ml.

Agreement of Replicate Titrations (must be within 1% or 0.2 ml.): ______

Average Volume of $BaCl_2$ Titrant Used, (Vt): ______ ml.

K = grams H_2SO_4 per milliequivalent = 0.04904 g/meq
or
lbs. H_2SO_4 per milliequivalent = 1.081 x 10^{4} lbs/meq

Vm(std) = Volume of gas sampled (corrected to standard conditions, from Particulate Calculations and Results Data Sheet) = ______ dscf

Sulfuric Acid Mist Concentration ($C_{H_2SO_4}$) equals:

$$C_{H_2SO_4} = K \quad \frac{(N_{BaCl_2})(Vt - Vtb)\left(\frac{Vsoln}{Va}\right)}{Vm(std)} =$$

$C_{H_2SO_4}$ = = ______ lbs/dscf

Sulfur Dioxide Blank

Visual Observations: Clear By: GHA

Sample No.: 3055 12% H_2O_2 Blank Any Noted Sample Loss: None

Volume of Hydrogen Peroxide Blank Titrated: Titration; #1 1.0 ml., #2 1.0 ml.

Volume of $BaCl_2$ Titrant Used: Titration; #1 0.06 ml., #2 0.06 ml.

Agreement of Replicate titrations (must be within 1% or 0.2 ml.): < 0.2 ml

Vtb = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: 0.06 ml.

Sulfur Dioxide Sample

Visual Observations: Clear **By:** GHR

Sample No.: 3046 ESP-B-3 **Any Noted Sample Loss:** None

Total Volume of SO_2 Sample (Vsoln) (should contain 1,000 ml.): 1000.0 ml.

Volume of SO_2 Sample Aliquot Titrated (Va) (should be 10 ml.): 10 ml.

Volume of $BaCl_2$ Titrant Used: Titration; #1 26.1 ml., #2 26.2 ml.

Agreement of Replicate Titrations (must be within 1% or 0.2 ml.): <0.2 ml

Average Volume of $BaCl_2$ Titrant Used, (Vt): 26.15 ml.

K = grams SO_2 per milliequivalent = 0.03203 g/meq
or
lbs. SO_2 per milliequivalent = 7.061×10^{-5} lb/meq

Vm(std) = Volume of gas sampled (corrected to standard conditions from Particulate Calculations and Results Data Sheet) = 48.5567 dscf

Sulfur Dioxide Concentration (Cso2) equals:

$$C_{SO_2} = \overset{7.061\times10^{-5}}{K}\ \frac{\overset{0.0115267}{(N_{BaCl_2})}\overset{(26.15-0.06)}{(V_t - V_{tb})}}{\underset{48.5567}{V_{m(std)}}}\ \overset{1000/1}{\left(\frac{V_{soln}}{V_a}\right)} =$$

C_{SO_2} = = 4.37696×10^{-4} lbs/dscf

Approved By: ____________ Date: ____________
Gary H. Revlett, Ph.D.
Analytical Chemist

$\times 6.024 \times 10^{6} =$ 2636 ppm

5a

Preliminary FIELD

KENVIRONS, INC.
EPA METHOD 8 LABORATORY
DATA SHEET FOR H_2SO_4 AND SO_2 CONCENTRATION

Client Bechtel Project No. 80019

Run No. BEC-ESP-B-4 Analysis Date 7/20/80 Analysis by GHR

Barium Chloride Standardization

Same As Run BEC-STK-4

Normality of H_2SO_4 Standard: Titration; #1 ______N, #2 ______N, #3 ______N

Milliliters of Standard H_2SO_4 Used: Titration; #1 ______ml, #2 ______ml, #3 ______ml.

Milliliters of $BaCl_2$ Titrant Used: Titration; #1 ______ml, #2 ______ml, #3 ______ml.

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

Normality of $BaCl_2$ Titrant equals: Titration; #1 ______, #2 ______, #3 ______

N = $BaCl_2$ Average Normality = 0.011502 N

Sulfuric Acid Mist Blank

Visual Observations: By:

Sample No.: ______ Any Noted Sample Loss: ______

Volume of 80% Isopropanol Titrated: Titration; #1 ______ml, #2 ______ml.

Volume of $BaCl_2$ Titrant Used: Titration; #1 ______ml, #2 ______ml.

Agreement of Replicate Titrations (must be within 1% or 0.2 ml.): ______

Vtb = Volume of $BaCl_2$ Titrant Used for the Blank = Average $BaCl_2$ Volume ______ml.

Sulfuric Acid Mist Sample

Visual Observations: ______ **By:** ______

Sample No.: ______ **Any Noted Sample Loss:** ______

Total Volume of H_2SO_4 Sample (Vsoln) (should contain 250 ml.): ______ **ml.**

Volume of H_2SO_4 Sample Aliquot (Va) (should be 100 ml.): ______ **ml.**

Volume of $BaCl_2$ Titrant Used: **Titration; #1** ______ **ml., #2** ______ **ml.**

Agreement of Replicate Titrations (must be within 1% or 0.2 ml.): ______

Average Volume of $BaCl_2$ Titrant Used, (Vt): ______ **ml.**

K = grams H_2SO_4 per milliequivalent = 0.04904 g/meq
or
lbs. H_2SO_4 per milliequivalent = 1.081×10^{-4} lbs/meq

Vm(std) = Volume of gas sampled (corrected to standard conditions, from Particulate Calculations and Results Data Sheet) = ______ **dscf**

Sulfuric Acid Mist Concentration ($C_{H_2SO_4}$) equals:

$$C_{H_2SO_4} = K \quad \frac{(N_{BaCl_2})(Vt - Vtb)\left(\frac{Vsoln}{Va}\right)}{Vm(std)} \quad =$$

$$C_{H_2SO_4} = \qquad\qquad = \underline{\qquad\qquad} \text{ lbs/dscf}$$

Sulfur Dioxide Blank

Same As Run BEC-ESP-A-4

Visual Observations: ______ **By:** ______

Sample No.: ______ **Any Noted Sample Loss:** ______

Volume of Hydrogen Peroxide Blank Titrated: **Titration; #1** ______ **ml., #2** ______ **ml.**

Volume of $BaCl_2$ Titrant Used: **Titration; #1** ______ **ml., #2** ______ **ml.**

Agreement of Replicate titrations (must be within 1% or 0.2 ml.): ______

Vtb = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: 0.0 **ml.**

Sulfur Dioxide Sample

Visual Observations: Clear By: GHR

Sample No.: 3062 (BEC-ESP-B-4 Any Noted Sample Loss: None

Total Volume of SO_2 Sample (Vsoln) (should contain 1,000 ml.): 1000.0 ml.

Volume of SO2 Sample Aliquot Titrated (Va) (should be 10 ml.): 1.0 ml.

Volume of $BaCl_2$ Titrant Used: Titration; #1 23.68 ml. #2 23.72 ml.

Agreement of Replicate Titrations (must be within 1% or 0.2 ml.): < 0.2 ml

Average Volume of $BaCl_2$ Titrant Used, (Vt): 23.70 ml.

K = grams SO2 per milliequivalent = 0.03203 g/meq
or
lbs. SO2 per milliequivalent = 7.061×10^{-5} lb/meq

Vm(std) = Volume of gas sampled (corrected to standard conditions from Particulate Calculations and Results Data Sheet) = 42.58075 dscf

Sulfur Dioxide Concentration (Cso_2) equals:

$$Cso_2 = \overset{7.061\times10^{-5}}{K}\ \frac{\overset{0.011502}{(N_{BaCl_2})}\overset{(23.70-0)}{(Vt - Vtb)}\left(\frac{Vsoln}{Va}\right)\overset{\frac{1000}{1}}{}}{\underset{42.58075}{Vm(std)}} =$$

Cso_2 = = 4.52038×10^{-4} lbs/dscf

Approved By: ______________ Date: __________
Gary H. Revlett, Ph.D.
Analytical Chemist

$\times 6.024 \times 10^{6} = 2723$ ppm

8c

Preliminary FIELD

KENVIRONS, INC.
EPA METHOD 8 LABORATORY
DATA SHEET FOR H_2SO_4 AND SO_2 CONCENTRATION

Client Bechtel Project No. 80019

Run No. BEC-ESP-B-5 Analysis Date 7/21/80 Analysis by GHR

Barium Chloride Standardization

Same As Run BEC-STK-5

Normality of H_2SO_4 Standard: Titration; #1 ____ N, #2 ____ N, #3 ____ N

Milliliters of Standard H_2SO_4 Used: Titration; #1 ____ ml, #2 ____ ml, #3 ____ ml.

Milliliters of $BaCl_2$ Titrant Used: Titration; #1 ____ ml, #2 ____ ml, #3 ____ ml.

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

Normality of $BaCl_2$ Titrant equals: Titration; #1 ____, #2 ____, #3 ____

N = $BaCl_2$ Average Normality = 0.01146 N

Sulfuric Acid Mist Blank

Visual Observations: By:

Sample No.: ____ Any Noted Sample Loss: ____

Volume of 80% Isopropanol Titrated: Titration; #1 ____ ml, #2 ____ ml.

Volume of $BaCl_2$ Titrant Used: Titration; #1 ____ ml, #2 ____ ml.

Agreement of Replicate Titrations (must be within 1% or 0.2 ml.): ____

Vtb = Volume of $BaCl_2$ Titrant Used for the Blank = Average $BaCl_2$ Volume ____ ml.

==

Sulfuric Acid Mist Sample

Visual Observations: ____ By: ____

Sample No.; ____ Any Noted Sample Loss: ____

Total Volume of H_2SO_4 Sample (Vsoln) (should contain 250 ml.): ____ ml.

Volume of H_2SO_4 Sample Aliquot (Va) (should be 100 ml.): ____ ml.

Volume of $BaCl_2$ Titrant Used: Titration; #1 ____ ml., #2 ____ ml.

Agreement of Replicate Titrations (must be within 1% or 0.2 ml.): ____

Average Volume of $BaCl_2$ Titrant Used, (Vt): ____ ml.

K = grams H_2SO_4 per milliequivalent = 0.04904 g/meq
or
lbs. H_2SO_4 per milliequivalent = 1.081×10^{-4} lbs/meq

Vm(std) = Volume of gas sampled (corrected to standard conditions, from Particulate Calculations and Results Data Sheet) = ____ dscf

Sulfuric Acid Mist Concentration ($C_{H_2SO_4}$) equals:

$$C_{H_2SO_4} = K \frac{(N_{BaCl_2})(Vt - Vtb)\left(\frac{Vsoln}{Va}\right)}{Vm(std)} =$$

$C_{H_2SO_4}$ = = ____ lbs/dscf

==

Sulfur Dioxide Blank

Same As BEC-ESP-A-5

Visual Observations: ____ By: ____

Sample No.: ____ Any Noted Sample Loss: ____

Volume of Hydrogen Peroxide Blank Titrated: Titration; #1 ____ ml., #2 ____ ml.

Volume of $BaCl_2$ Titrant Used: Titration; #1 ____ ml., #2 ____ ml.

Agreement of Replicate titrations (must be within 1% or 0.2 ml.): ____

Vtb = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: 0.0 ml.

==

Sulfur Dioxide Sample

Visual Observations: Clear **By:** GHR

Sample No.: 3076 ESP-BEC-B-5 **Any Noted Sample Loss:** None

Total Volume of SO_2 Sample (Vsoln) (should contain 1,000 ml): 1000.0 ml.

Volume of SO_2 Sample Aliquot Titrated (Va) (should be 10 ml): 1.0 ml.

Volume of $BaCl_2$ Titrant Used: Titration; #1 21.2 ml, #2 21.3 ml.

Agreement of Replicate Titrations (must be within 1% or 0.2 ml): <0.2

Average Volume of $BaCl_2$ Titrant Used, (Vt): 21.25 ml.

K = grams SO_2 per milliequivalent = 0.03203 g/meq
or
lbs. SO_2 per milliequivalent = 7.061×10^{-5} lb/meq

Vm(std) = Volume of gas sampled (corrected to standard conditions from Particulate Calculations and Results Data Sheet) = 41.8235 dscf

Sulfur Dioxide Concentration (C_{SO_2}) equals:

$$C_{SO_2} = K \frac{(N_{BaCl_2})(Vt - Vtb)\left(\frac{Vsoln}{Va}\right)}{Vm(std)} = 2477 \text{ ppm}$$

$$C_{SO_2} = \frac{(7.061\times10^{-5})(0.01146)(21.25)(1000)}{41.8235} = 4.1114\times10^{-4} \text{ lbs/dscf}$$

Approved By: ____________ Date: ____________
Gary H. Revlett, Ph.D.
Analytical Chemist

H
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Preliminary FIELD

KENVIRONS, INC.
EPA METHOD 8 LABORATORY
DATA SHEET FOR SO_2 CONCENTRATION

Client Bechtel Project No. 80019

Run No. BEC-ESP-B-6 Analysis Date 2/22/8 Analysis by GHL

Barium Chloride Standardization

Same As Run BEC-STK-6

Normality of H_2SO_4 Standard:	Titration; #1	N, #2	N, #3	
Milliliters of Standard H_2SO_4 Used:	Titration; #1	ml., #2	ml., #3	
Milliliters of $BaCl_2$ Titrant Used:	Titration; #1	ml., #2	ml., #3	

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

Normality of $BaCl_2$ Titrant equals: Titration; #1 , #2 , #3

N = $BaCl_2$ Average Normality = 0.0115245 N

Sulfur Dioxide Blank

Same As Run BEC-ESP-A-6

Visual Observations: By:

Sample No.: Any Noted Sample Loss:

Volume of Hydrogen Peroxide Blank Titrated: Titration; #1 ml., #2

Volume of $BaCl_2$ Titrant Used: Titration; #1 ml., #2

Agreement of Replicate titrations (must be within 1% or 0.2 ml.):

Vtb = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume:

Sulfur Dioxide Sample

Visual Observations: Clear By: GHR

ample No.: 3089 (BEC-ESP-B-C) Any Noted Sample Loss: None

otal Volume of SO_2 Sample (Vsoln) (should contain 1000 ml.): 1000.0

Volume of SO_2 Sample Aliquot Titrated (Va) (should be 20 ml.): 1.0

olume of $BaCl_2$ Titrant Used: Titration; #1 24.70 ml., #2 24.80

greement of Replicate Titrations (must be within 1% or 0.2 ml.): < 0.2 ml

verage Volume of $BaCl_2$ Titrant Used, (Vt): 24.75

K_2 = grams SO_2 per milliequivalent = 0.03203 g/meq
or
lbs. SO_2 per milliequivalent = 7.061×10^{-5} lb/meq

n(std) = Volume of gas sampled (corrected to standard conditions from Method 6 Field
rm = ds

Sulfur Dioxide Concentration (C_{SO_2}) equals:

$$C_{SO_2} = \overset{7.061\times10^{-5}}{K_2}\ \frac{\overset{0.0115245}{(N_{BaCl_2})}\ \overset{(24.75-0)}{(V_t - V_{tb})}}{\underset{41.9777}{V_{m(std)}}}\left(\frac{V_{soln}}{V_a}\right)\frac{1000}{1} =$$

$$C_{SO_2} = \qquad = 4.7978\times10^{-4} \text{ lbs/ds}$$

Approved By: Date:
Gary H. Revlett, Ph.D.
Analytical Chemist

$\times 6.024 \times 10^6 = 2890$ ppm

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KENVIRONS, INC. Preliminary FIELD
EPA METHOD 8 LABORATORY
DATA SHEET FOR SO_2 CONCENTRATION

Client Bechtel Project No. 80019
Run No. BEC-ESP-B7 Analysis Date 7/23/80 Analysis by GAF

Barium Chloride Standardization

SAME AS Run No. BEC-STK-7

Normality of H_2SO_4 Standard: Titration; #1 ______ N, #2 ______ N, #3 ______
Milliliters of Standard H_2SO_4 Used: Titration; #1 ______ ml, #2 ______ ml, #3 ______
Milliliters of $BaCl_2$ Titrant Used: Titration; #1 ______ ml, #2 ______ ml, #3 ______

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

Normality of $BaCl_2$ Titrant equals: Titration; #1 ______, #2 ______, #3 ______
N = $BaCl_2$ Average Normality = 0.01155 N

Sulfur Dioxide Blank

SAME AS Run No. BEC-ESP-A-7

Visual Observations: ______ By: ______
Sample No.: ______ Any Noted Sample Loss: ______
Volume of Hydrogen Peroxide Blank Titrated: Titration; #1 ______ ml, #2 ______
Volume of $BaCl_2$ Titrant Used: Titration; #1 ______ ml, #2 ______
Agreement of Replicate titrations (must be within 1% or 0.2 ml.): ______
Vtb = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: 0.0 ml

√4

Sulfur Dioxide Sample

Visual Observations: Clear By: GHR

ample No.: 3164 (BEC-ESP-B-7) Any Hoted Sample Loss: None

otal Volume of SO_2 Sample (Vsoln) (should contain 1000 ml.): 1000.0

olume of SO2 Sample Aliquot Titrated (Va) (should be ~~20~~ 1.0 ml.): 1.0

Volume of $BaCl_2$ Titrant Used: Titration; #1 17.70 ml., #2 17.85

greement of Replicate Titrations (must be within 1% or 0.2 ml.): <0.2ml

verage Volume of $BaCl_2$ Titrant Used, (Vt): 17.775

K_2= grams SO2 per milliequivalent = 0.03203 g/meq
or
lbs. SO2 per milliequivalent = 7.061 x 10^{-5} lb/meq

m(std) = Volume of gas sampled (corrected to standard conditions from Method 6 Field
orm = 37.65 d

Sulfur Dioxide Concentration (C_{SO_2}) equals:

$$C_{SO_2} = K_2 \frac{(N_{BaCl_2})(V_t - V_{tb})}{V_{m(std)}} \left(\frac{V_{soln}}{V_a}\right) =$$

$$C_{SO_2} = \frac{7.061 \times 10^{-5} (17.775 - 0) \frac{1000}{1} (0.01155)}{37.65} = 3.8503 \times 10^{-4} \text{ lbs/ds}$$

Approved By: ______ Date: ______
Gary H. Revlett, Ph.D.
Analytical Chemist

$C_{SO_2} \times 6.024 \times 10^{6} = 2319$ ppm

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Preliminary FIELD

KENVIRONS, INC.
EPA METHOD 8 LABORATORY
DATA SHEET FOR SO_2 CONCENTRATION

Client Bechtel Project No. 80019
Run No. BEC-ESP-B-8 Analysis Date 7/24/80 Analysis by GAR

Barium Chloride Standardization

SAme AS Run No. BEC-STL-8

Normality of H_2SO_4 Standard: Titration; #1 ________ N, #2 ________ N, #3 ______
Milliliters of Standard H_2SO_4 Used: Titration; #1 ______ ml., #2 ______ ml., #3 ______
Milliliters of $BaCl_2$ Titrant Used: Titration; #1 ______ ml., #2 ______ ml., #3 ______

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

Normality of $BaCl_2$ Titrant equals: Titration; #1 ________, #2 ________, #3 ______
N = $BaCl_2$ Average Normality = __________ N

Sulfur Dioxide Blank

SAme As Run No. BEC-ESP-A-8

Visual Observations: By:
Sample No.: ______________________ Any Noted Sample Loss: ______________
Volume of Hydrogen Peroxide Blank Titrated: Titration; #1 __________ ml., #2 __________ m
Volume of $BaCl_2$ Titrant Used: Titration; #1 __________ ml., #2 __________ m
Agreement of Replicate titrations (must be within 1% or 0.2 ml.): ______________
tb = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: __________ m

Sulfur Dioxide Sample

Visual Observations: Clear By: BAR

ample No.: 3116 (BEC-ESP-B-8 Any Noted Sample Loss: None

otal Volume of SO_2 Sample (Vsoln) (should contain 100 ml.): 1000 ml

olume of SO_2 Sample Aliquot Titrated (Va) (should be 20 ml.): 1.0

Volume of $BaCl_2$ Titrant Used: Titration; #1 1904 ml., #2 18.88

greement of Replicate Titrations (must be within 1% or 0.2 ml.): < 0.2 ml

verage Volume of $BaCl_2$ Titrant Used, (Vt): 18.96

K_2 = grams SO_2 per milliequivalent = 0.03203 g/meq
or
lbs. SO_2 per milliequivalent = 7.061×10^{-5} lb/meq

m(std) = Volume of gas sampled (corrected to standard conditions from Method 6 Field
orm = __________ ds

Sulfur Dioxide Concentration (C_{SO_2}) equals:

$$C_{SO_2} = \overset{7.061\times10^{-5}}{K_2}\ \frac{\overset{0.0119345}{(N_{BaCl_2})}\overset{(18.96-0)}{(V_t - V_{tb})}}{\underset{40.9224}{V_{m(std)}}}\ \left(\frac{V_{soln}}{V_a}\right)\frac{1000}{1} =$$

C_{SO_2} = 3.9139×10^{-4} lbs/ds

Approved By: __________ Date: __________
Gary H. Revlett, Ph.D.
Analytical Chemist

$\times\ 6.024 \times 10^{6} =$ 2358 ppm

Preliminary (FIELD

KENVIRONS, INC.
EPA METHOD 8 LABORATORY
DATA SHEET FOR SO_2 CONCENTRATION

Client Bechtel Project No. 80019

Run No. BEC-ESP-B-9 Analysis Date 7/25/80 Analysis by GHR

Barium Chloride Standardization

Same As Run No. BEC-STK-9

Normality of H_2SO_4 Standard: Titration; #1 ____ N, #2 ____ N, #3 ____

Milliliters of Standard H_2SO_4 Used: Titration; #1 ____ ml., #2 ____ ml., #3 ____

Milliliters of $BaCl_2$ Titrant Used: Titration; #1 ____ ml., #2 ____ ml., #3 ____

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

Normality of $BaCl_2$ Titrant equals: Titration; #1 ____, #2 ____, #3 ____

N = $BaCl_2$ Average Normality = 0.0101488 N

Sulfur Dioxide Blank

Same As Run No. BEC-ESP-A-9

isual Observations: ____

By: ____

Sample No.: ____ Any Noted Sample Loss: ____

olume of Hydrogen Peroxide Blank Titrated: Titration; #1 ____ ml., #2 ____

Volume of $BaCl_2$ Titrant Used: Titration; #1 ____ ml., #2 ____

Agreement of Replicate titrations (must be within 1% or 0.2 ml.): ____

tb = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: 0

ℓx

Sulfur Dioxide Sample

Visual Observations: Clear By: GHR

mple No.: 3/33 Any Noted Sample Loss: None

tal Volume of SO_2 Sample (Vsoln) (should contain ~~100~~ ml.): 1000 ml

olume of SO2 Sample Aliquot Titrated (Va) (should be ~~20~~ 10 ml.): 10

Volume of $BaCl_2$ Titrant Used: Titration; #1 22.66 ml., #2 22.55

reement of Replicate Titrations (must be within 1% or 0.2 ml.): < 0.2 ml

Average Volume of $BaCl_2$ Titrant Used, (Vt): 22.605

K_2 = grams SO2 per milliequivalent = 0.03203 g/meq
or
lbs. SO2 per milliequivalent = 7.061 x 10^{-5} lb/meq

(std) = Volume of gas sampled (corrected to standard conditions from Method 6 Field
orm = ______

Sulfur Dioxide Concentration (C_{SO_2}) equals:

$$C_{SO_2} = \overset{7.061\times10^{-5}}{K_2}\ \frac{\overset{0.101488}{(N_{BaCl_2})}\ \overset{(22.605-0)}{(V_t - V_{tb})}}{\underset{41.2060}{V_m(std)}} \left(\frac{V_{soln}}{V_a}\right) \frac{1000}{1} =$$

C_{SO_2} = = 3.931198×10^{-4} lbs/d

Approved By: ______ Date: ______
Gary H. Revlett, Ph.D.
Analytical Chemist

$\times 6.024 \times 10^{6} = \underline{2368}$ ppm

45

Preliminary (FIELD

KENVIRONS, INC.
EPA METHOD 6 LABORATORY
DATA SHEET FOR SO_2 CONCENTRATION

Client Bechtel Project No. 20019

Run No BEC-ESPB-10 Analysis Date 7/26/80 Analysis by GHr

Barium Chloride Standardization

Same As Run No. BEC ~~ESPB~~ STK -10

Normality of H_2SO_4 Standard: Titration; #1 ____ N, #2 ____ N, #3 ____

Milliliters of Standard H_2SO_4 Used: Titration; #1 ____ ml., #2 ____ ml., #3 ____

Milliliters of $BaCl_2$ Titrant Used: Titration; #1 ____ ml., #2 ____ ml., #3 ____

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

Normality of $BaCl_2$ Titrant equals: Titration; #1 ____, #2 ____, #3 ____

N = $BaCl_2$ Average Normality = 0.01012 N

Sulfur Dioxide Blank

Same As Run No. BEC-ESPB-10

Visual Observations: By:

Sample No.: ____ Any Noted Sample Loss: ____

Volume of Hydrogen Peroxide Blank Titrated: Titration; #1 ____ ml., #2 ____

Volume of $BaCl_2$ Titrant Used: Titration; #1 ____ ml., #2 ____

Agreement of Replicate titrations (must be within 1% or 0.2 ml.): ____

Vtb = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: 0.04

Sulfur Dioxide Sample

Visual Observations: Clear By: CHA

mple No.: 3146 (BECr-ESP-B-1A) Any Noted Sample Loss: None

tal Volume of SO_2 Sample (Vsoln) (should contain 100 ml.): 1000.0

olume of SO_2 Sample Aliquot Titrated (Va) (should be ~~20~~ 1.0 ml.): 1.0

olume of $BaCl_2$ Titrant Used: Titration; #1 21.02 ml., #2 21.11

reement of Replicate Titrations (must be within 1% or 0.2 ml.): < 0.2 ml

verage Volume of $BaCl_2$ Titrant Used, (Vt): 21.065

K_2 = grams SO_2 per milliequivalent = 0.03203 g/meq

or

lbs. SO_2 per milliequivalent = 7.061×10^{-5} lb/meq

(std) = Volume of gas sampled (corrected to standard conditions from Method 6 Field Form = 39.6989

Sulfur Dioxide Concentration (C_{SO_2}) equals:

$$C_{SO_2} = K_2 \frac{(N_{BaCl_2})(Vt - Vtb)\left(\frac{Vsoln}{Va}\right)}{Vm(std)} =$$

$$C_{SO_2} = 7.061 \times 10^{-5} \cdot \frac{(.01012)(21.065 - .04)\left(\frac{1000}{1}\right)}{39.6989} = 3.78 \times 10^{-9} \text{ lbs/}$$

Approved By: ____________ Date: ________

Gary H. Revlett, Ph.D.
Analytical Chemist

$3.78 \times 10^{-4} \times 6.024 \times 10^{6} = 2277.$ ppm

STK-(1-10)

51

Preliminary

FIELD

KENVIRONS, INC.
EPA METHOD 8 LABORATORY
DATA SHEET FOR H_2SO_4 AND SO_2 CONCENTRATION

Client Bechtel Project No. 80019

Run No. STK-1 Analysis Date 7/17/80 Analysis by GHR – PFK

Barium Chloride Standardization

Normality of H_2SO_4 Standard: Titration; #1 0.0102 N, #2 0.0102 N, #3 0.0102 N

Milliliters of Standard H_2SO_4 Used: Titration; #1 25.0 ml., #2 25.0 ml., #3 25.0 ml.

Milliliters of $BaCl_2$ Titrant Used: Titration; #1 22.02 ml., #2 22.05 ml., #3 22.02 ml.

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

Normality of $BaCl_2$ Titrant equals: Titration; #1 .01158, #2 .01156, #3 .01158

N = $BaCl_2$ Average Normality = .01157 N

Sulfuric Acid Mist Blank

Visual Observations: By:

Sample No.: Any Noted Sample Loss:

Volume of 80% Isopropanol Titrated: Titration; #1 ml., #2 ml

Volume of $BaCl_2$ Titrant Used: Titration; #1 ml., #2 ml

Agreement of Replicate Titrations (must be within 1% or 0.2 ml.):

Assume Zero

Vtb = Volume of $BaCl_2$ Titrant Used for the Blank = Average $BaCl_2$ Volume 0.0 ml

---

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Sulfuric Acid Mist Sample

Visual Observations: Clear **By:** GHR

Sample No.; BEC-STK-1 **Any Noted Sample Loss:** —

Total Volume of H_2SO_4 Sample (Vsoln) (should contain 250 ml.): — ml.

Volume of H_2SO_4 Sample Aliquot (Va) (should be 100 ml.): — ml.

Volume of $BaCl_2$ Titrant Used: Titration; #1 ______ ml., #2 ______ ml.

Agreement of Replicate Titrations (must be within 1% or 0.2 ml.): ______

Average Volume of $BaCl_2$ Titrant Used, (Vt): ______ ml.

K = grams H_2SO_4 per milliequivalent = 0.04904 g/meq
or
lbs. H_2SO_4 per milliequivalent = 1.081×10^4 lbs/meq

Vm(std) = Volume of gas sampled (corrected to standard conditions, from Particulate Calculations and Results Data Sheet) = ______ dscf

Sulfuric Acid Mist Concentration ($C_{H_2SO_4}$) equals:

$$C_{H_2SO_4} = K \quad \frac{(N_{BaCl_2})(Vt - Vtb)\left(\frac{Vsoln}{Va}\right)}{Vm(std)} \quad =$$

$C_{H_2SO_4}$ = = ______ lbs/dscf

Sulfur Dioxide Blank

Visual Observations: **By:**

Sample No.: ______ **Any Noted Sample Loss:** ______

Volume of Hydrogen Peroxide Blank Titrated: Titration; #1 ______ ml., #2 ______ ml.

Volume of $BaCl_2$ Titrant Used: Titration; #1 ______ ml., #2 ______ ml.

Agreement of Replicate·titrations (must be within 1% or 0.2 ml.): Assume Zero

Vtb = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: 0.0 ml.

53

Sulfur Dioxide Sample

Visual Observations: Clear By: GHe

Sample No.: BEC - STK - 1' Any Noted Sample Loss: None

Total Volume of SO_2 Sample (Vsoln) (should contain 1,000 ml.): 1000 m

Volume of SO_2 Sample Aliquot Titrated (Va) (should be 10 ml.): 20 m

Volume of $BaCl_2$ Titrant Used: Titration; #1 19.5 ml., #2 19.6 m

Agreement of Replicate Titrations (must be within 1% or 0.2 ml.): 19.55

Average Volume of $BaCl_2$ Titrant Used, (Vt): 19.55 m

K = grams SO_2 per milliequivalent = 0.03203 g/meq
or
lbs. SO_2 per milliequivalent = 7.061×10^{-5} lb/meq

Vm(std) = Volume of gas sampled (corrected to standard conditions from Particulate Calculations and Results Data Sheet) = ______ dsc

Sulfur Dioxide Concentration (C_{SO_2}) equals:

$$C_{SO_2} = K \frac{\overset{0.01157}{(N_{BaCl_2})}\overset{(19.55-0)}{(V_t - V_{tb})}\left(\frac{V_{soln}}{V_a}\right)^{\frac{1000}{20}}}{\underset{33.2}{V_{m(std)}}} =$$

$K = 7.061 \times 10^{-5}$

C_{SO_2} = = 2.3952×10^{-5} lbs/dsc

Approved By: ______ Date: ______
Gary H. Revlett, Ph.D.
Analytical Chemist

$\times\ 6.024 \times 10^{6} =$ 144 ppm

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Preliminary FIELD

KENVIRONS, INC.
EPA METHOD 8 LABORATORY
DATA SHEET FOR H_2SO_4 AND SO_2 CONCENTRATION

Client Bechtel Project No. 8C019

Run No. BEC-STK-2 Analysis Date 7/18/90 Analysis by GHR

Barium Chloride Standardization

Normality of H_2SO_4 Standard:	Titration; #1 0.0102 N,	#2 0.0102 N,	#3 0.0102
Milliliters of Standard H_2SO_4 Used:	Titration; #1 25.0 ml,	#2 25.0 ml,	#3 25.0 ml
Milliliters of $BaCl_2$ Titrant Used:	Titration; #1 22.04 ml,	#2 22.11 ml,	#3 22.01 ml

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

Normality of $BaCl_2$ Titrant equals: Titration; #1 .011569, #2 .011533, #3 .011585

N = $BaCl_2$ Average Normality = 0.011562 N

Sulfuric Acid Mist Blank

Visual Observations: By: DAB

Sample No.: Any Noted Sample Loss:

Volume of 80% Isopropanol Titrated: Titration; #1 ml, #2

Volume of $BaCl_2$ Titrant Used: Titration; #1 ml, #2

Agreement of Replicate Titrations (must be within 1% or 0.2 ml.):

Vtb = Volume of $BaCl_2$ Titrant Used for the Blank = Average $BaCl_2$ Volume

Sulfuric Acid Mist Sample

Visual Observations: By:

Sample No.; Any Noted Sample Loss:

Total Volume of H_2SO_4 Sample (Vsoln) (should contain 250 ml.): ml.

Volume of H_2SO_4 Sample Aliquot (Va) (should be 100 ml.): ml.

Volume of $BaCl_2$ Titrant Used: Titration; #1 ml., #2 ml.

Agreement of Replicate Titrations (must be within 1% or 0.2 ml.):

Average Volume of $BaCl_2$ Titrant Used, (Vt): ml.

K = grams H_2SO_4 per milliequivalent = 0.04904 g/meq
or
lbs. H_2SO_4 per milliequivalent = 1.081×10^{-4} lbs/meq

Vm(std) = Volume of gas sampled (corrected to standard conditions, from Particulate Calculations and Results Data Sheet) = dscf

Sulfuric Acid Mist Concentration ($C_{H_2SO_4}$) equals:

$$C_{H_2SO_4} = K \; \frac{(N_{BaCl_2})(V_t - V_{tb})\left(\frac{V_{soln}}{V_a}\right)}{V_{m(std)}} =$$

$C_{H_2SO_4}$ = = lbs/dscf

Sulfur Dioxide Blank

Visual Observations: By: DAB

Sample No.: 3033 Any Noted Sample Loss:

Volume of Hydrogen Peroxide Blank Titrated: Titration; #1 10 ml., #2 10 ml

Volume of $BaCl_2$ Titrant Used: Titration; #1 0.01 ml., #2 0.01 ml

Agreement of Replicate titrations (must be within 1% or 0.2 ml.): < 0.2

Vtb = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: 0.01 ml

Sulfur Dioxide Sample

Visual Observations: Clear By: GHR

Sample No.: 3032 DEC-STK-2 Any Noted Sample Loss: ________

Total Volume of SO_2 Sample (Vsoln) (should contain 1,000 ml): 1000. m

Volume of SO_2 Sample Aliquot Titrated (Va) (should be 10 ml): 10. m

Volume of $BaCl_2$ Titrant Used: Titration; #1 13.48 ml, #2 13.51 m

Agreement of Replicate Titrations (must be within 1% or 0.2 ml): [illegible]

Average Volume of $BaCl_2$ Titrant Used, (Vt): 13.495 m

K = grams SO_2 per milliequivalent = 0.03203 g/meq
or
lbs. SO_2 per milliequivalent = 7.061×10^{-5} lb/meq

Vm(std) = Volume of gas sampled (corrected to standard conditions from Particulate Calculations and Results Data Sheet) = ________ dsc

Sulfur Dioxide Concentration (C_{SO_2}) equals:

7.061x10⁻⁵ .011567 (13.495 - 0.01 100

$$C_{SO_2} = K \frac{(N_{BaCl_2})(V_t - V_{tb})\left(\frac{V_{soln}}{V_a}\right)}{V_{m(std)}} =$$

35.1449

C_{SO_2} = 3.1324×10^{-5} lbs/ds

Approved By: ________ Date: ________
Gary H. Revlett, Ph.D.
Analytical Chemist

$\times 6.024 \times 10^{6} = 189$ ppm

Preliminary

FIELD

KENVIRONS, INC.
EPA METHOD 8 LABORATORY
DATA SHEET FOR H_2SO_4 AND SO_2 CONCENTRATION

Client Bechtel Project No. 80049

Run No. BEC-STK-3 Analysis Date 7/19/80 Analysis by DAB + FHR

Barium Chloride Standardization

Normality of H_2SO_4 Standard: Titration; #1 0.0102 N, #2 0.0102 N, #3 0.0102

Milliliters of Standard H_2SO_4 Used: Titration; #1 25.0 ml, #2 25.0 ml, #3 25.0

Milliliters of $BaCl_2$ Titrant Used: Titration; #1 22.11 ml, #2 22.08 ml, #3 22.12

$$N = \text{Normality of } BaCl_2 = \frac{\overset{0.0102}{\text{Normality of } H_2SO_4} \times \overset{25}{\text{ml. of } H_2SO_4}}{\underset{22.11}{\text{ml. of } BaCl_2}}$$

Normality of $BaCl_2$ Titrant equals: Titration; #1 0.0115332, #2 0.0115489, #3 0.011528

N = $BaCl_2$ Average Normality = 0.0115367 N

Sulfuric Acid Mist Blank

Visual Observations: By:

Sample No.: Any Noted Sample Loss:

Volume of 80% Isopropanol Titrated: Titration; #1 ml, #2

Volume of $BaCl_2$ Titrant Used: Titration; #1 ml, #2

Agreement of Replicate Titrations (must be within 1% or 0.2 ml.):

Vtb = Volume of $BaCl_2$ Titrant Used for the Blank = Average $BaCl_2$ Volume

Sulfuric Acid Mist Sample

Visual Observations: By:

Sample No.; ______________ **Any Noted Sample Loss:** ______________

Total Volume of H_2SO_4 Sample (Vsoln) (should contain 250 ml.): ______________ ml.

Volume of H_2SO_4 Sample Aliquot (Va) (should be 100 ml.): ______________ ml.

Volume of $BaCl_2$ Titrant Used: Titration; #1 ________ ml., #2 ________ ml.

Agreement of Replicate Titrations (must be within 1% or 0.2 ml.): ______________

Average Volume of $BaCl_2$ Titrant Used, (Vt): ______________ ml.

K = grams H_2SO_4 per milliequivalent = 0.04904 g/meq

or

lbs. H_2SO_4 per milliequivalent = 1.081×10^{4} lbs/meq

Vm(std) = Volume of gas sampled (corrected to standard conditions, from Particulate Calculations and Results Data Sheet) = ______________ dscf

Sulfuric Acid Mist Concentration ($C_{H_2SO_4}$) equals:

$$C_{H_2SO_4} = K \frac{(N_{BaCl_2})(Vt - Vtb)\left(\frac{Vsoln}{Va}\right)}{Vm(std)} =$$

$$C_{H_2SO_4} = \qquad = \underline{\qquad\qquad} \text{ lbs/dscf}$$

Sulfur Dioxide Blank

Visual Observations: Clear **By:** DAB

Sample No.: 3054 3% H_2O_2 Blank **Any Noted Sample Loss:** None

Volume of Hydrogen Peroxide Blank Titrated: Titration; #1 10.0 ml., #2 10.0 ml.

Volume of $BaCl_2$ Titrant Used: Titration; #1 0.30 ml., #2 0.31 ml.

Agreement of Replicate titrations (must be within 1% or 0.2 ml.): < 0.2

Vtb = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: 0.31 ml.

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Sulfur Dioxide Sample

Visual Observations: Clear **By:** GHR

Sample No.: 3053 BEC-STK-3 **Any Noted Sample Loss:** None

Total Volume of SO_2 Sample (Vsoln) (should contain 1,000 ml.): 1000 m

Volume of SO_2 Sample Aliquot Titrated (Va) (should be 10 ml.): 10 m

Volume of $BaCl_2$ Titrant Used: Titration; #1 12.08 ml., #2 12-06 m

Agreement of Replicate Titrations (must be within 1% or 0.2 ml.): < 0.2

Average Volume of $BaCl_2$ Titrant Used, (Vt): 12.07 m

K = grams SO_2 per milliequivalent = 0.03203 g/meq
or
lbs. SO_2 per milliequivalent = 7.061×10^{-5} lb/meq

Vm(std) = Volume of gas sampled (corrected to standard conditions from Particulate Calculations and Results Data Sheet) = 32.3209 dsc

Sulfur Dioxide Concentration (C_{SO_2}) equals:

$$C_{SO_2} = \overset{7.061\times10^{-5}}{K}\ \frac{\overset{0.0115367}{(N_{BaCl_2})}\overset{(12.07-0.31)}{(Vt - Vtb)}}{\underset{32.3209}{Vm(std)}}\left(\frac{Vsoln}{Va}\right)^{\frac{1000}{10}} = 2.96395\times10^{-5}$$

C_{SO_2} = ~~5.25227 × 10^{-5}~~ lbs/dsc

Approved By: ______________ Date: __________
Gary H. Revlett, Ph.D.
Analytical Chemist

179.5 ppm

× 6.024 × 10^6 = ~~315.17~~

80

Preliminary

FIELD

KENVIRONS, INC.
EPA METHOD 8 LABORATORY
DATA SHEET FOR H_2SO_4 AND SO_2 CONCENTRATION

Client Bechtel Project No. 80019

Run No. BEC-STK-4 Analysis Date 7/20/80 Analysis by DAB / GHR

Barium Chloride Standardization

Normality of H_2SO_4 Standard: Titration; #1 0.0102 N, #2 ____ N, #3 ____

Milliliters of Standard H_2SO_4 Used: Titration; #1 25 ml, #2 ____ ml, #3 ____ ml

Milliliters of $BaCl_2$ Titrant Used: Titration; #1 22.08 ml, #2 22.11 ml, #3 22.10 ml

22.0967 ml

$$N = \text{Normality of } BaCl_2 = \frac{\overset{0.0102}{\text{Normality of } H_2SO_4} \times \overset{25}{\text{ml. of } H_2SO_4}}{\underset{22.08}{\text{ml. of } BaCl_2}}$$

Normality of $BaCl_2$ Titrant equals: Titration; #1 ____, #2 22. ____, #3 ____

N = $BaCl_2$ Average Normality = 0.0115020 N

Sulfuric Acid Mist Blank

Visual Observations: ____ By: ____

Sample No.: ____ Any Noted Sample Loss: ____

Volume of 80% Isopropanol Titrated: Titration; #1 ____ ml, #2 ____ ml

Volume of $BaCl_2$ Titrant Used: Titration; #1 ____ ml, #2 ____ ml

Agreement of Replicate Titrations (must be within 1% or 0.2 ml.): ____

Vtb = Volume of $BaCl_2$ Titrant Used for the Blank = Average $BaCl_2$ Volume ____ ml

Sulfuric Acid Mist Sample

Visual Observations: By:

Sample No.; Any Noted Sample Loss:

Total Volume of H_2SO_4 Sample (Vsoln) (should contain 250 ml.): ml.

Volume of H_2SO_4 Sample Aliquot (Va) (should be 100 ml.): ml.

Volume of $BaCl_2$ Titrant Used: Titration; #1 ml., #2 ml.

Agreement of Replicate Titrations (must be within 1% or 0.2 ml.):

Average Volume of $BaCl_2$ Titrant Used, (Vt): ml.

K = grams H_2SO_4 per milliequivalent = 0.04904 g/meq
or
lbs. H_2SO_4 per milliequivalent = 1.081 x 10^{-4} lbs/meq

Vm(std) = Volume of gas sampled (corrected to standard conditions, from Particulate Calculations and Results Data Sheet) = dscf

Sulfuric Acid Mist Concentration ($C_{H_2SO_4}$) equals:

$$C_{H_2SO_4} = K \quad \frac{(N_{BaCl_2})(Vt - Vtb)\left(\frac{Vsoln}{Va}\right)}{Vm(std)} =$$

$C_{H_2SO_4}$ = = lbs/dscf

Sulfur Dioxide Blank

Visual Observations: By:

Sample No.: 3067 Any Noted Sample Loss:

Volume of Hydrogen Peroxide Blank Titrated: Titration; #1 10 ml., #2 10 ml.

Volume of $BaCl_2$ Titrant Used: Titration; #1 0.01 ml., #2 0.01 ml.

Agreement of Replicate titrations (must be within 1% or 0.2 ml.): ~~0.01~~

Vtb = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: 0.01 ml.

62

Sulfur Dioxide Sample

Visual Observations: By: DAB

Sample No.: 3070 **Any Noted Sample Loss:** ____

Total Volume of SO_2 Sample (Vsoln) (should contain 1,000 ml.): 1000 ml.

Volume of SO_2 Sample Aliquot Titrated (Va) (should be 10 ml.): 10 ml.

Volume of $BaCl_2$ Titrant Used: Titration; #1 12.02 ml., #2 11.94 ml.

Agreement of Replicate Titrations (must be within 1% or 0.2 ml.): ____

Average Volume of $BaCl_2$ Titrant Used, (Vt): 11.98 ml.

K = grams SO_2 per milliequivalent = 0.03203 g/meq
or
lbs. SO_2 per milliequivalent = 7.061×10^{-5} lb/meq

Vm(std) = Volume of gas sampled (corrected to standard conditions from Particulate Calculations and Results Data Sheet) = 31.6962 dscf

Sulfur Dioxide Concentration (C_{SO_2}) equals:

$$C_{SO_2} = \overset{7.061\times10^{5}}{K}\ \frac{\overset{0.011502}{(N_{BaCl_2})}\overset{(11.98-.01)}{(V_t - V_{tb})}}{\underset{31.6962}{V_m(std)}}\left(\frac{V_{soln}}{V_a}\right)\frac{1000}{10} =$$

$$C_{SO_2} = \qquad = 3.06806\times10^{-5}\ \text{lbs/dscf}$$

Approved By: ____ **Date:** ____
Gary H. Revlett, Ph.D.
Analytical Chemist

$\times 6.024\times10^{6} =$ 195 ppm

Preliminary

KENVIRONS, INC.
EPA METHOD 8 LABORATORY FIELD
DATA SHEET FOR H_2SO_4 AND SO_2 CONCENTRATION

Client Bechtel Project No. 80069

Run No BEX-STK-5 Analysis Date 7/21/80 Analysis by GHR

Barium Chloride Standardization

Normality of H_2SO_4 Standard: Titration; #1 0.0102 N, #2 0.0102 N, #3 0.0102

Milliliters of Standard H_2SO_4 Used: Titration; #1 25.0 ml, #2 25.0 ml, #3 25.0

Milliliters of $BaCl_2$ Titrant Used: Titration; #1 22.33 ml, #2 22.25 ml, #3 22.18

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

Normality of $BaCl_2$ Titrant equals: Titration; #1 0.01142, #2 0.01146, #3 0.0115

N = $BaCl_2$ Average Normality = 0.01146 N

Sulfuric Acid Mist Blank

Visual Observations: By:

Sample No.: Any Noted Sample Loss:

Volume of 80% Isopropanol Titrated: Titration; #1 ml, #2

Volume of $BaCl_2$ Titrant Used: Titration; #1 ml, #2

Agreement of Replicate Titrations (must be within 1% or 0.2 ml.):

Vtb = Volume of $BaCl_2$ Titrant Used for the Blank = Average $BaCl_2$ Volume

Sulfuric Acid Mist Sample

Visual Observations: ______ **By:** ______

Sample No.: ______ Any Noted Sample Loss: ______

Total Volume of H_2SO_4 Sample (Vsoln) (should contain 250 ml.): ______ ml.

Volume of H_2SO_4 Sample Aliquot (Va) (should be 100 ml.): ______ ml.

Volume of $BaCl_2$ Titrant Used: Titration; #1 ______ ml., #2 ______ ml.

Agreement of Replicate Titrations (must be within 1% or 0.2 ml.): ______

Average Volume of $BaCl_2$ Titrant Used, (Vt): ______ ml.

K = grams H_2SO_4 per milliequivalent = 0.04904 g/meq
or
lbs. H_2SO_4 per milliequivalent = 1.081×10^{4} lbs/meq

Vm(std) = Volume of gas sampled (corrected to standard conditions, from Particulate Calculations and Results Data Sheet) = ______ dscf

Sulfuric Acid Mist Concentration ($C_{H_2SO_4}$) equals:

$$C_{H_2SO_4} = K \quad \frac{(N_{BaCl_2})(Vt - Vtb)\left(\frac{Vsoln}{Va}\right)}{Vm(std)} =$$

$C_{H_2SO_4}$ = = ______ lbs/dscf

Sulfur Dioxide Blank

Visual Observations: Clear **By:** GAR

Sample No.: 3082 BEC-STK-5 Any Noted Sample Loss: None

Volume of Hydrogen Peroxide Blank Titrated: Titration; #1 10 ml., #2 10 ml.

Volume of $BaCl_2$ Titrant Used: Titration; #1 0.01 ml., #2 0.01 ml.

Agreement of Replicate titrations (must be within 1% or 0.2 ml.): <0.2

Vtb = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: 0.01 ml.

Sulfur Dioxide Sample

Visual Observations: Clear By: GHR

Sample No.: 3082 BLL-STK-5 Any Noted Sample Loss: None

Total Volume of SO_2 Sample (Vsoln) (should contain 1,000 ml): 1000.0 ml.

Volume of SO_2 Sample Aliquot Titrated (Va) (should be 10 ml): 10.0 ml.

Volume of $BaCl_2$ Titrant Used: Titration; #1 10.15 ml, #2 10.18 ml.

Agreement of Replicate Titrations (must be within 1% or 0.2 ml): < 0.2 ml

Average Volume of $BaCl_2$ Titrant Used, (Vt): 10.165 ml.

K = grams SO_2 per milliequivalent = 0.03203 g/meq
or
lbs. SO_2 per milliequivalent = 7.061×10^{-5} lb/meq

Vm(std) = Volume of gas sampled (corrected to standard conditions from Particulate Calculations and Results Data Sheet) = 31.3184 dscf

Sulfur Dioxide Concentration (C_{SO_2}) equals:

$$C_{SO_2} = K \frac{(M_{BaCl_2})(V_t - V_{tb}) \left(\frac{V_{soln}}{V_a}\right)}{V_{m(std)}} = \quad 158 \text{ ppm}$$

$$C_{SO_2} = \frac{(7.061 \times 10^{-5})(0.01146)(10.165 - \text{[illegible]})(100)}{31.3184} = 2.62 \times 10^{-5} \text{ lbs/dscf}$$

Approved By: ______________ Date: __________
Gary H. Revlett, Ph.D.
Analytical Chemist

6.024×10^{6}

GC

Preliminary

~~KENVIRONS~~, INC.

EPA METHOD & LABORATORY FIELD

DATA SHEET FOR SO_2 CONCENTRATION

Client Bechtel Project No. 80029

Run No. BEC-STK-6 Analysis Date 7/22/80 Analysis by GHR

Barium Chloride Standardization

Normality of H_2SO_4 Standard: Titration; #1 0.0102 N, #2 0.0102 N, #3 0.0102

Milliliters of Standard H_2SO_4 Used: Titration; #1 25.0 ml., #2 25.0 ml., #3 25.0

Milliliters of $BaCl_2$ Titrant Used: Titration; #1 22.14 ml., #2 22.16 ml., #3 22.08

avg 22.12667

$$N = \text{Normality of } BaCl_2 = \frac{\overset{0.0102}{\text{Normality of } H_2SO_4} \times \overset{25}{\text{ml. of } H_2SO_4}}{\underset{22.12667}{\text{ml. of } BaCl_2}}$$

Normality of $BaCl_2$ Titrant equals: Titration; #1 ______, #2 ______, #3 ______

N = $BaCl_2$ Average Normality = 0.0115245 N

Sulfur Dioxide Blank

isual Observations: Clear By: GAr

Sample No.: 3094 (32 H_2O Blank) Any Noted Sample Loss: None

olume of Hydrogen Peroxide Blank Titrated: Titration; #1 10.0 ml., #2 10.0 m

olume of $BaCl_2$ Titrant Used: Titration; #1 0.01 ml., #2 0.01 m

Agreement of Replicate titrations (must be within 1% or 0.2 ml.): < 0.2

tb = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: 0.01 m

KENVIRONS, INC.
EPA METHOD 8 LABORATORY ~~FIELD~~ Preliminary
DATA SHEET FOR SO_2 CONCENTRATION

Client Bechtel Project No. 8009

Run No. BEC-STK-7 Analysis Date 7/23/86 Analysis by GAR

Barium Chloride Standardization

ormality of H_2SO_4 Standard: Titration; #1 0.0102 N, #2 0.0102 N, #3 0.0102

illiliters of Standard H_2SO_4 Used: Titration; #1 25.0 ml., #2 25.0 ml., #3 25.0

Milliliters of $BaCl_2$ Titrant Used: Titration; #1 22.01 ml., #2 22.12 ml., #3 22.14

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

ormality of $BaCl_2$ Titrant equals: Titration; #1 0.01159, #2 0.01153, #3 0.0115

N = $BaCl_2$ Average Normality = 0.01155 N

Sulfur Dioxide Blank

isual Observations: Clear By: GAR

Sample No.: 3112 (30% H_2O_2 Blank Any Noted Sample Loss: None

olume of Hydrogen Peroxide Blank Titrated: Titration; #1 10.0 ml., #2 10.0 m

olume of $BaCl_2$ Titrant Used: Titration; #1 0.0 ml., #2 0.0 m

Agreement of Replicate titrations (must be within 1% or 0.2 ml.): < 0.2 ml

tb = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: 0.0 m

Sulfur Dioxide Sample

Visual Observations: Clear **By:** GHR

ample No.: 3771 (BEC-STK-7) **Any Noted Sample Loss:** None

otal Volume of SO_2 Sample (Vsoln) (should contain 1000 ml.): 1000.0

Volume of SO_2 Sample Aliquot Titrated (Va) (should be $\overset{10.0}{20}$ ml.): 10.0

Volume of $BaCl_2$ Titrant Used: Titration; #1 8.92 ml., #2 8.93

greement of Replicate Titrations (must be within 1% or 0.2 ml.): ✓

verage Volume of $BaCl_2$ Titrant Used, (Vt): 8.925

K_2 = grams SO_2 per milliequivalent = 0.03203 g/meq

or

lbs. SO_2 per milliequivalent = 7.061 x 10^{-5} lb/meq

(std) = Volume of gas sampled (corrected to standard conditions from Method 6 Field Form = 27.66 ds

Sulfur Dioxide Concentration (C_{SO_2}) equals:

$$C_{SO_2} = K_2 \frac{(N_{BaCl_2})(Vt - Vtb)\left(\frac{Vsoln}{Va}\right)}{Vm(std)} =$$

$$C_{SO_2} = \frac{7.061 \times 10^{-5} (0.01155)(8.925-0)\frac{1000}{10}}{27.66} = 2.6315 \times 10^{-5} \text{ lbs/ds}$$

Approved By: ________ Date: ________

Gary H. Revlett, Ph.D.
Analytical Chemist

$C_{SO_2} (6.024 \times 10^{6}) = 158.5$ ppm

KENVIRONS, INC.
EPA METHOD 6 LABORATORY *Preliminary FIELD*
DATA SHEET FOR SO_2 CONCENTRATION

Client Bechtel Project No. 80019
Run No. BEC-STK-8 Analysis Date 7/24/86 Analysis by CHR

Barium Chloride Standardization

ormality of H_2SO_4 Standard: Titration; #1 0.0102 N, #2 0.0102 N, #3 0.010
Milliliters of Standard H_2SO_4 Used: Titration; #1 25.0 ml, #2 25.0 ml, #3 25.0
milliliters of $BaCl_2$ Titrant Used: Titration; #1 21.28 ml, #2 21.42 ml, #3 21.40

21.3666

$$N = \text{Normality of } BaCl_2 = \frac{\overset{0.0102}{\text{Normality of } H_2SO_4} \times \overset{25.0}{\text{ml. of } H_2SO_4}}{\underset{21.3666}{\text{ml. of } BaCl_2}}$$

ormality of $BaCl_2$ Titrant equals: Titration; #1 ______, #2 ______, #3 ______
N = $BaCl_2$ Average Normality = 0.0119345 N

Sulfur Dioxide Blank

isual Observations: Clear By: CHR
Sample No.: 3112 Any Noted Sample Loss: None
olume of Hydrogen Peroxide Blank Titrated: Titration; #1 10.0 ml, #2 10.0 m
olume of $BaCl_2$ Titrant Used: Titration; #1 0.0 ml, #2 0.0 m
Agreement of Replicate titrations (must be within 1% or 0.2 ml): < 0.2 ml
b = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: 0.0 m

Sulfur Dioxide Sample

Visual Observations: Clear By: GHR

ample No.: 8/29 (3% [illegible] [illegible] STK #) Any Noted Sample Loss: None

otal Volume of SO_2 Sample (Vsoln) (should contain 1000 ml.): 1000.0

olume of SO_2 Sample Aliquot Titrated (Va) (should be ~~20~~ 10 ml.): 10.0

Volume of $BaCl_2$ Titrant Used: Titration; #1 8.68 ml., #2 8.71

greement of Replicate Titrations (must be within 1% or 0.2 ml.): < 0.2 ml

verage Volume of $BaCl_2$ Titrant Used, (Vt): 8.69

K_2 = grams SO_2 per milliequivalent = 0.03203 g/meq
or
lbs. SO_2 per milliequivalent = 7.061×10^{-5} lb/meq

m(std) = Volume of gas sampled (corrected to standard conditions from Method 6 Field
orm = ______ ds

Sulfur Dioxide Concentration (C_{SO_2}) equals:

$$C_{SO_2} = \overset{7.061\times10^{-5}}{K_2}\ \frac{\overset{0.0119345}{(N_{BaCl_2})}\overset{(8.69-0.0)}{(Vt - Vtb)}}{\underset{29.2847}{Vm(std)}} \left(\frac{Vsoln}{Va}\right)\frac{1000}{10} =$$

C_{SO_2} = = 2.50063×10^{-5} lbs/ds

Approved By: ______ Date: ______
Gary H. Revlett, Ph.D.
Analytical Chemist

$\times\ 6.024 \times 10^{6} =$ 150.6 ppm

Preliminary

KENVIRONS, INC.

FIELD EPA METHOD 6 LABORATORY

DATA SHEET FOR SO_2 CONCENTRATION

FISHER 22 *

Client Bechtel Project No. 80019

Run No. BEC-STK-9 Analysis Date 7/25/80 Analysis by GHR

Barium Chloride Standardization

Normality of H_2SO_4 Standard: Titration; #1 0.0100 ± 0.0001 N, #2 0.0100 N, #3 0.010

Milliliters of Standard H_2SO_4 Used: Titration; #1 25.0 ml., #2 25.0 ml., #3 25.0

Milliliters of $BaCl_2$ Titrant Used: Titration; #1 24.62 ml., #2 24.62 ml., #3 24.6

$$N = \text{Normality of } BaCl_2 = \frac{\overset{0.0100}{\text{Normality of } H_2SO_4} \times \overset{25}{\text{ml. of } H_2SO_4}}{\underset{24.6233}{\text{ml. of } BaCl_2}}$$

ormality of $BaCl_2$ Titrant equals: Titration; #1 _____, #2 _____, #3 _____

N = $BaCl_2$ Average Normality = 0.0101488 N high 0.010250 low 0.010047

Sulfur Dioxide Blank

isual Observations: Clear By: GHR

Sample No.: 3140 (3% H_2O_2 Blank) Any Noted Sample Loss: None

olume of Hydrogen Peroxide Blank Titrated: Titration; #1 10.0 ml., #2 10.0

olume of $BaCl_2$ Titrant Used: Titration; #1 0.0 ml., #2 0.0

Agreement of Replicate titrations (must be within 1% or 0.2 ml.): < 0.2 ml

tb = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: 0.0

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Sulfur Dioxide Sample

Visual Observations: Clear By: GHR

ample No.: 3135 (3% H_2O_2 Rinse) Any Noted Sample Loss: None

otal Volume of SO_2 Sample (Vsoln) (should contain 1000 ml.): 1000.0

olume of SO_2 Sample Aliquot Titrated (Va) (should be ~~20~~ 10.0 ml): 10.0

Volume of $BaCl_2$ Titrant Used: Titration; #1 9.40 ml., #2 9.45

greement of Replicate Titrations (must be within 1% or 0.2 ml): < 0.2 ml

verage Volume of $BaCl_2$ Titrant Used, (Vt): 9.425

K_2 = grams SO_2 per milliequivalent = 0.03203 g/meq
or
lbs. SO_2 per milliequivalent = 7.061×10^{-5} lb/meq

m(std) = Volume of gas sampled (corrected to standard conditions from Method 6 Field Form = ______ ds

Sulfur Dioxide Concentration (C_{SO_2}) equals:

$$C_{SO_2} = \overset{7.061\times10^{-5}}{K_2}\ \frac{\overset{0.101489}{(N_{BaCl_2})}\overset{(9.425-0)}{(V_t - V_{tb})}}{\underset{31.0029}{V_m(std)}}\ \overset{1000/10}{\left(\frac{V_{soln}}{V_a}\right)} =$$

C_{SO_2} = = 2.1785×10^{-5} lbs/ds

Approved By: ______ Date: ______
Gary H. Revlett, Ph.D.
Analytical Chemist

$\times 6.024 \times 10^{6} =$ 131 ppm

2X

Preliminary

~~KENVIRONS,~~ INC.
EPA METHOD 6 LABORATORY
DATA SHEET FOR SO_2 CONCENTRATION FIELD

Client . Bechtel Project No. 80019

Run No. BEC-5K-14 Analysis Date 7/26/80 Analysis by GHR

Barium Chloride Standardization

Normality of H_2SO_4 Standard: Titration; #1 0.0100 N, #2 0.0100 N, #3 0.01

Milliliters of Standard H_2SO_4 Used: Titration; #1 25. ml, #2 25.0 ml, #3 25.

Milliliters of $BaCl_2$ Titrant Used: Titration; #1 24.66 ml, #2 24.76 ml, #3 24.7

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

Normality of $BaCl_2$ Titrant equals: Titration; #1 .01014, #2 .01010, #3 .010

N = $BaCl_2$ Average Normality = .01012 N

Sulfur Dioxide Blank

Visual Observations: By:

Sample No.: 3153 (3% H_2O_2 Blank Any Noted Sample Loss:

Volume of Hydrogen Peroxide Blank Titrated: Titration; #1 10.0 ml, #2 10.0

Volume of $BaCl_2$ Titrant Used: Titration; #1 0.10 ml, #2 0.10

Agreement of Replicate titrations (must be within 1% or 0.2 ml): <0.2

Vtb = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: 0.10

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Sulfur Dioxide Sample

Visual Observations: Clear By: GHR

ample No.: 3155 (EC-STK-10) Any Noted Sample Loss: None

tal Volume of SO_2 Sample (Vsoln) (should contain 1000 ml.): 1000.0

lume of SO_2 Sample Aliquot Titrated (Va) (should be ~~20~~ 10.0 ml): 10.0

Volume of $BaCl_2$ Titrant Used: Titration; #1 9.24 ml., #2 9.26

greement of Replicate Titrations (must be within 1% or 0.2 ml): < 0.2 ml

erage Volume of $BaCl_2$ Titrant Used, (Vt): 9.25

K_2 = grams SO_2 per milliequivalent = 0.03203 g/meq

or

lbs. SO_2 per milliequivalent = 7.061×10^{-5} lb/meq

(std) = Volume of gas sampled (corrected to standard conditions from Method 6 Field
orm = 29.37 d

Sulfur Dioxide Concentration (C_{SO_2}) equals:

$$C_{SO_2} = K_2 \frac{(N_{BaCl_2})(V_t - V_{tb})\left(\frac{V_{soln}}{V_a}\right)}{V_{m(std)}} =$$

$$C_{SO_2} = \overset{7.061\times10^{-5}}{\cancel{.03203}} \frac{(.01012)(9.25 - .1)\left(\frac{1000}{10}\right)}{29.37} = \overset{2.226\times10^{-5}}{\cancel{.01010}} \text{ lbs/d}$$

Approved By: ____________ Date: ________
Gary H. Revlett, Ph.D.
Analytical Chemist

$2.226 \times 10^{-5} \times 6.024 \times 10^{6} = 134.09$ ppm

Analytical SO_2 Final

(Sequence: ESP-A-(1-10); ESP-B-(1-10); and STK-(1-10))
(Start on pp G-75; G-95; and G-113)

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ESP-A-(1-10)

KENVIRONS, INC.
EPA METHOD 6 LABORATORY
DATA SHEET FOR SO_2 CONCENTRATION

Client Bectell (LGE) Project No. 80019

Run No. ESP-A-1 Analysis Date July 30 Analysis by Paul Rup

Barium Chloride Standardization

lormality of H_2SO_4 Standard: Titration; #1 .0100 N, #2 .0100 N, #3 .0100

Milliliters of Standard H_2SO_4 Used: Titration; #1 20 ml., #2 20 ml., #3 20

.illiliters of $BaCl_2$ Titrant Used: Titration; #1 19.59 ml., #2 19.58 ml., #3 ~~19.55~~ 19.66

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

ormality of $BaCl_2$ Titrant equals: Titration; #1 .01021, #2 .01021, #3 .0102

N = $BaCl_2$ Average Normality = .01021 N

Sulfur Dioxide Blank

isual Observations: By:

Sample No.: 3018 Any Noted Sample Loss:

lume of Hydrogen Peroxide Blank Titrated: Titration; #1 1 ml., #2 1 m

olume of $BaCl_2$ Titrant Used: Titration; #1 .02 ml., #2 .02 m

greement of Replicate titrations (must be within 1% or 0.2 ml.):

b = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: .02 m

Sulfur Dioxide Sample

Visual Observations: By:

mple No.: 3016 Any Noted Sample Loss:

tal Volume of SO_2 Sample (Vsoln) (should contain 100 ml.): 1000

lume of SO_2 Sample Aliquot Titrated (Va) (should be 20 ml): 1

olume of $BaCl_2$ Titrant Used: Titration; #1 21.70 ml., #2 21.66

reement of Replicate Titrations (must be within 1% or 0.2 ml):

verage Volume of $BaCl_2$ Titrant Used, (Vt): 21.68

K_2 = grams SO_2 per milliequivalent = 0.03203 g/meq
or
lbs. SO_2 per milliequivalent = 7.061 x 10^{-5} lb/meq

(std) = Volume of gas sampled (corrected to standard conditions from Method 6 Field
m = 40.41 ds

Sulfur Dioxide Concentration (C_{SO_2}) equals:

$$C_{SO_2} = \overset{7.061 \times 10^{-5}}{K_2} \frac{\overset{.01021}{(N_{BaCl_2})}\overset{(21.68 - .2)}{(V_t - V_{tb})}}{\underset{40.41}{V_{m(std)}}} \left(\frac{V_{soln}}{V_a}\right) \frac{1000}{1} =$$

RST

C_{SO_2} = 3.8642 x 10^{-4} lbs/dsc

Approved By: Gary H Revlett Date: 8/20/80
Gary H. Revlett, Ph.D.
Analytical Chemist

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KENVIRONS, INC.
EPA METHOD 6 LABORATORY
DATA SHEET FOR SO_2 CONCENTRATION

Client Bectell (LGE) Project No. 80019

Run No. ESP-A-2 Analysis Date July 30 Analysis by Pal Ramp

Barium Chloride Standardization

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ormality of H_2SO_4 Standard: Titration; #1 ______ N, #2 ______ N, #3 ______

Milliliters of Standard H_2SO_4 Used: Titration; #1 ______ ml, #2 ______ ml, #3 ______

illiliters of $BaCl_2$ Titrant Used: Titration; #1 ______ ml, #2 ______ ml, #3 ______

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

---

ormality of $BaCl_2$ Titrant equals: Titration; #1 ______, #2 ______, #3 ______

N = $BaCl_2$ Average Normality = .01021 N

Same as ESP-A-1

Sulfur Dioxide Blank

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isual Observations: By:

Sample No.: 3036 Any Noted Sample Loss: ______

olume of Hydrogen Peroxide Blank Titrated: Titration; #1 1 ml, #2 1 m

olume of $BaCl_2$ Titrant Used: Titration; #1 .02 ml, #2 .02 m

greement of Replicate titrations (must be within 1% or 0.2 ml): ______

b = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: .02 m

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Sulfur Dioxide Sample

isual Observations: By:

mple No.: 3034 Any Noted Sample Loss:

tal Volume of SO_2 Sample (Vsoln) (should contain 100 ml.): 1000

olume of SO_2 Sample Aliquot Titrated (Va) (should be 20 ml.): 1

lume of $BaCl_2$ Titrant Used: Titration; #1 20.87 ml., #2 20.92

reement of Replicate Titrations (must be within 1% or 0.2 ml):

erage Volume of $BaCl_2$ Titrant Used, (Vt): 20.895

K_2 = grams SO_2 per milliequivalent = 0.03203 g/meq
or
lbs. SO_2 per milliequivalent = 7.061×10^{-5} lb/meq

(std) = Volume of gas sampled (corrected to standard conditions from Method 6 Field
= 42.14 dsc

Sulfur Dioxide Concentration (C_{SO_2}) equals:

$$C_{SO_2} = \overset{7.061 \times 10^{-5}}{K_2} \frac{\overset{.01021}{(N_{BaCl_2})}\overset{(20.895 - .02)}{(V_t - V_{tb})}}{\underset{42.14}{V_{m(std)}}} \left(\frac{V_{soln}}{V_a}\right)^{\frac{1000}{1}} =$$

RST

C_{SO_2} = = 3.5712×10^{-4} lbs/dsc

Approved By: Gary H. Revlett Date: 8/20/80
Gary H. Revlett, Ph.D.
Analytical Chemist

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KENVIRONS, INC.
EPA METHOD 6 LABORATORY
DATA SHEET FOR SO_2 CONCENTRATION

Client Beckell (LGE) Project No. 80019

Run No. ESP-A-3 Analysis Date July 30 Analysis by Pal Rap

Barium Chloride Standardization

ormality of H_2SO_4 Standard: Titration; #1 ____ N, #2 ____ N, #3 ____

Milliliters of Standard H_2SO_4 Used: Titration; #1 ____ ml, #2 ____ ml, #3 ____

illiliters of $BaCl_2$ Titrant Used: Titration; #1 ____ ml, #2 ____ ml, #3 ____

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

Normality of $BaCl_2$ Titrant equals: Titration; #1 ____, #2 ____, #3 ____

N = $BaCl_2$ Average Normality = .01021 N

Same as ESP-A-1

Sulfur Dioxide Blank

isual Observations: By:

Sample No.: 3055 Any Noted Sample Loss: ____

olume of Hydrogen Peroxide Blank Titrated: Titration; #1 1 ml, #2 1 m

Volume of $BaCl_2$ Titrant Used: Titration; #1 .04 ml, #2 .02 m

greement of Replicate titrations (must be within 1% or 0.2 ml): ____

b = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: .03 ml

8'

Sulfur Dioxide Sample

isual Observations: By:

mple No.: 3048 Any Noted Sample Loss:

tal Volume of SO_2 Sample (Vsoln) (should contain 100 ml.): 1000

olume of SO_2 Sample Aliquot Titrated (Va) (should be 20 ml): 1

olume of $BaCl_2$ Titrant Used: Titration; #1 22.18 ml., #2 ~~[illegible]~~ 22.02

reement of Replicate Titrations (must be within 1% or 0.2 ml):

verage Volume of $BaCl_2$ Titrant Used, (Vt): 22.10

K_2 = grams SO_2 per milliequivalent = 0.03203 g/meq
or
lbs. SO_2 per milliequivalent = 7.061×10^{-5} lb/meq

(std) = Volume of gas sampled (corrected to standard conditions from Method 6 Field
m = 43.42 ds

Sulfur Dioxide Concentration (C_{SO_2}) equals:

$$C_{SO_2} = \overset{7.061\times10^{-5}}{K_2}\ \frac{\overset{.01021}{(N_{BaCl_2})}\overset{(22.10\ \ .03)}{(V_t - V_{tb})}}{\underset{43.42}{V_m(std)}} \left(\frac{V_{soln}}{V_a}\right) \frac{1000}{1} =$$

RST

C_{SO_2} = = 3.6644×10^{-4} lbs/dsc

Approved By: Gary H. Revlett Date: 8/20/80
Gary H. Revlett, Ph.D.
Analytical Chemist

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KENVIRONS, INC.
EPA METHOD 6 LABORATORY
DATA SHEET FOR SO_2 CONCENTRATION

Client Bechtel (LGE) Project No. 80019

Run No. ESP-A-4 Analysis Date July 30 Analysis by

Barium Chloride Standardization

ormality of H_2SO_4 Standard: Titration; #1 ______ N, #2 ______ N, #3 ______

Milliliters of Standard H_2SO_4 Used: Titration; #1 ______ ml, #2 ______ ml, #3 ______

illiliters of $BaCl_2$ Titrant Used: Titration; #1 ______ ml, #2 ______ ml, #3 ______

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

ormality of $BaCl_2$ Titrant equals: Titration; #1 ______, #2 ______, #3 ______

N = $BaCl_2$ Average Normality = .01021 N

Same as ESP-A-1

Sulfur Dioxide Blank

isual Observations: By:

ample No.: 3066 Any Noted Sample Loss:

lume of Hydrogen Peroxide Blank Titrated: Titration; #1 1 ml, #2 1 ml

olume of $BaCl_2$ Titrant Used: Titration; #1 .04 ml, #2 .06 ml

greement of Replicate titrations (must be within 1% or 0.2 ml):

b = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: .05 ml

Sulfur Dioxide Sample

isual Observations: ______ By: ______

mple No.: 3063 Any Noted Sample Loss: ______

tal Volume of SO_2 Sample (Vsoln) (should contain 100 ml.): 1000

lume of SO_2 Sample Aliquot Titrated (Va) (should be 20 ml.): 1

olume of $BaCl_2$ Titrant Used: Titration; #1 22.98 ml, #2 22.97

reement of Replicate Titrations (must be within 1% or 0.2 ml): ______

verage Volume of $BaCl_2$ Titrant Used, (Vt): 22.975

K_2 = grams SO_2 per milliequivalent = 0.03203 g/meq
or
lbs. SO_2 per milliequivalent = 7.061×10^{-5} lb/meq

(std) = Volume of gas sampled (corrected to standard conditions from Method 6 Field
m = 41.77 ds

Sulfur Dioxide Concentration (C_{SO_2}) equals:

$$C_{SO_2} = \overset{7.061\times10^{-5}}{K_2} \frac{\overset{.01021}{(N_{BaCl_2})}\overset{(22.975-.05)}{(V_t - V_{tb})}\left(\frac{V_{soln}}{V_a}\right)^{\frac{1000}{1}}}{\underset{41.77}{V_{m(std)}}} =$$

RST

C_{SO_2} = 3.9567×10^{-4} lbs/ds

Approved By: Gary H. Revlett Date: 8/20/80
Gary H. Revlett, Ph.D.
Analytical Chemist

KENVIRONS, INC.
EPA METHOD 6 LABORATORY
DATA SHEET FOR SO_2 CONCENTRATION

Client Bectell (LGE) Project No. 80019

Run No. ESP-A-5 Analysis Date July 30 Analysis by

Barium Chloride Standardization

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ormality of H_2SO_4 Standard: Titration; #1 ______ N, #2 ______ N, #3 ______

Milliliters of Standard H_2SO_4 Used: Titration; #1 ______ ml, #2 ______ ml, #3 ______

illiliters of $BaCl_2$ Titrant Used: Titration; #1 ______ ml, #2 ______ ml, #3 ______

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

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ormality of $BaCl_2$ Titrant equals: Titration; #1 ______, #2 ______, #3 ______

N = $BaCl_2$ Average Normality = .01021 N

Same as ESP-A-1

Sulfur Dioxide Blank

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sual Observations: By:

ample No.: 3083 Any Noted Sample Loss: ______

lume of Hydrogen Peroxide Blank Titrated: Titration; #1 1 ml; #2 1 m

olume of $BaCl_2$ Titrant Used: Titration; #1 .02 ml, #2 .02 ml

greement of Replicate titrations (must be within 1% or 0.2 ml): ______

b = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: .02 ml

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Sulfur Dioxide Sample

Visual Observations: By:

mple No.: 3081 Any Noted Sample Loss:

tal Volume of SO_2 Sample (Vsoln) (should contain 100 ml.): 1000

lume of SO2 Sample Aliquot Titrated (Va) (should be 20 ml.): 1

olume of $BaCl_2$ Titrant Used: Titration; #1 23.35 ml., #2 23.39

reement of Replicate Titrations (must be within 1% or 0.2 ml.):

verage Volume of $BaCl_2$ Titrant Used, (Vt): 23.37

K_2= grams SO2 per milliequivalent = 0.03203 g/meq
or
lbs. SO2 per milliequivalent = 7.061×10^{-5} lb/meq

(std) = Volume of gas sampled (corrected to standard conditions from Method 6 Field
m = 43.50 ds

Sulfur Dioxide Concentration (C_{SO_2}) equals:

$$C_{SO_2} = \overset{7.061\times10^{-5}}{K_2} \frac{\overset{.01021}{(N_{BaCl_2})}\overset{(23.37-.02)}{(V_t - V_{tb})}}{\underset{43.50}{V_m(std)}} \left(\frac{V_{soln}}{V_a}\right) \frac{1000}{1} =$$

RST

C_{SO_2} = = 3.8698×10^{-4} lbs/ds

Approved By: Gary K. Revlett Date: 8/20/98
Gary H. Revlett, Ph.D.
Analytical Chemist

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KENVIRONS, INC.
EPA METHOD 6 LABORATORY
DATA SHEET FOR SO_2 CONCENTRATION

Client Beckell (LGE) Project No. 80019
Run No. ESP-A-6 Analysis Date July 30 Analysis by Pal Rup

Barium Chloride Standardization

ormality of H_2SO_4 Standard: Titration; #1 ____ N, #2 ____ N, #3 ____
Milliliters of Standard H_2SO_4 Used: Titration; #1 ____ ml, #2 ____ ml, #3 ____
illiliters of $BaCl_2$ Titrant Used: Titration; #1 ____ ml, #2 ____ ml, #3 ____

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

rmality of $BaCl_2$ Titrant equals: Titration; #1 .01021, #2 ____, #3 ____
N = $BaCl_2$ Average Normality = ____ N
Same as ESP-A-1

Sulfur Dioxide Blank

sual Observations: By:
ample No.: 3095 Any Noted Sample Loss: ____
lume of Hydrogen Peroxide Blank Titrated: Titration; #1 1 ml, #2 1 ml
olume of $BaCl_2$ Titrant Used: Titration; #1 .02 ml, #2 .02 ml
greement of Replicate titrations (must be within 1% or 0.2 ml): ____
= Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: 0.02 ml

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Sulfur Dioxide Sample

isual Observations: By:

mple No.: 3089 Any Noted Sample Loss:

tal Volume of SO_2 Sample (Vsoln) (should contain 100 ml.): 1000

olume of SO_2 Sample Aliquot Titrated (Va) (should be 20 ml.): 1

olume of $BaCl_2$ Titrant Used: Titration; #1 23.52 ml., #2 23.40

reement of Replicate Titrations (must be within 1% or 0.2 ml):

verage Volume of $BaCl_2$ Titrant Used, (Vt): 23.46 JB

K_2 = grams SO_2 per milliequivalent = 0.03203 g/meq
or
lbs. SO_2 per milliequivalent = 7.061×10^{-5} lb/meq

(std) = Volume of gas sampled (corrected to standard conditions from Method 6 Field
rm = 43.36 ds

Sulfur Dioxide Concentration (C_{SO_2}) equals:

$$C_{SO_2} = K_2 \frac{\overset{.01021}{(N_{BaCl_2})}\overset{(23.46-.02)}{(V_t - V_{tb})}}{\underset{43.36}{V_m(std)}} \left(\frac{V_{soln}}{V_a}\right)\frac{1000}{1} =$$

RST

C_{SO_2} = = 3.8972×10^{-4} lbs/ds

Approved By: Gary H. Revlett Date: 8/26/85
Gary H. Revlett, Ph.D.
Analytical Chemist

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KENVIRONS, INC.
EPA METHOD 6 LABORATORY
DATA SHEET FOR SO_2 CONCENTRATION

Client Bechtel (LGE) Project No. 80019

Run No. ESP-A-7 Analysis Date July 31 Analysis by

Barium Chloride Standardization

ormality of H_2SO_4 Standard: Titration; #1 .0100 N, #2 .0100 N, #3 .0100

lliliters of Standard H_2SO_4 Used: Titration; #1 20 ml, #2 20 ml, #3 20

illiliters of $BaCl_2$ Titrant Used: Titration; #1 19.48 ml, #2 1959 ml, #3 19.59

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

rmality of $BaCl_2$ Titrant equals: Titration; #1 .01027, #2 .01021, #3 .0102

N = $BaCl_2$ Average Normality = .01023 N

Sulfur Dioxide Blank

isual Observations: By:

ample No.: 3113 Any Noted Sample Loss:

Volume of Hydrogen Peroxide Blank Titrated: Titration; #1 1 ml, #2 1 m

olume of $BaCl_2$ Titrant Used: Titration; #1 .02 ml, #2 .02 m

Agreement of Replicate titrations (must be within 1% or 0.2 ml):

vtb = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: .02 m

Sulfur Dioxide Sample

isual Observations: By:

mple No.: 3106 Any Noted Sample Loss:

tal Volume of SO_2 Sample (Vsoln) (should contain 100 ml.): 1000

olume of SO_2 Sample Aliquot Titrated (Va) (should be 20 ml.): 1

olume of $BaCl_2$ Titrant Used: Titration; #1 19.0 ml., #2 19.02

reement of Replicate Titrations (must be within 1% or 0.2 ml.):

verage Volume of $BaCl_2$ Titrant Used, (Vt): 19.01

K_2 = grams SO_2 per milliequivalent = 0.03203 g/meq
or
lbs. SO_2 per milliequivalent = 7.061×10^{-5} lb/meq

(std) = Volume of gas sampled (corrected to standard conditions from Method 6 Field
rm = 40.58 ds

Sulfur Dioxide Concentration (C_{SO_2}) equals:

$$C_{SO_2} = \overset{7.061\times10^{-5}}{K_2}\ \frac{\overset{.01023\ (19.01-.02)}{(N_{BaCl_2})(V_t - V_{tb})}}{\underset{40.58}{V_{m(std)}}} \left(\frac{V_{soln}}{V_a}\right)^{\frac{1000}{1}} =$$

RST

C_{SO_2} = = 3.3802×10^{-4} lbs/ds

Approved By: Gary H Revlett Date: 8/20/86
Gary H. Revlett, Ph.D.
Analytical Chemist

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KENVIRONS, INC.
EPA METHOD 6 LABORATORY
DATA SHEET FOR SO_2 CONCENTRATION

Client Batell (LGE) **Project No.** 80019
Run No. ESP-A-8 **Analysis Date** July 31 **Analysis by**

Barium Chloride Standardization

ormality of H_2SO_4 Standard: Titration; #1 ____ N, #2 ____ N, #3 ____
Milliliters of Standard H_2SO_4 Used: Titration; #1 ____ ml, #2 ____ ml, #3 ____
illiliters of $BaCl_2$ Titrant Used: Titration; #1 ____ ml, #2 ____ ml, #3 ____

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

ormality of $BaCl_2$ Titrant equals: Titration; #1 ____, #2 ____, #3 ____

N = $BaCl_2$ Average Normality = .01023 N
Same as ESP-A7

Sulfur Dioxide Blank

sual Observations: By:
ample No.: 3128 Any Noted Sample Loss: ____
lume of Hydrogen Peroxide Blank Titrated: Titration; #1 1 ml, #2 1 m
lume of $BaCl_2$ Titrant Used: Titration; #1 .02 ml, #2 .04 m
greement of Replicate titrations (must be within 1% or 0.2 ml): ____
b = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: .03 ml

9

Sulfur Dioxide Sample

isual Observations:

By:

mple No.: 3121 Any Noted Sample Loss:

tal Volume of SO_2 Sample (Vsoln) (should contain 100 ml.): 1000

olume of SO_2 Sample Aliquot Titrated (Va) (should be 20 ml.): 1

olume of $BaCl_2$ Titrant Used: Titration; #1 21.10 ml., #2 21.03

reement of Replicate Titrations (must be within 1% or 0.2 ml):

verage Volume of $BaCl_2$ Titrant Used, (Vt): 21.065

K_2 = grams SO_2 per milliequivalent = 0.03203 g/meq

or

lbs. SO_2 per milliequivalent = 7.061×10^{-5} lb/meq

(std) = Volume of gas sampled (corrected to standard conditions from Method 6 Field

rm = 43.14 ds

Sulfur Dioxide Concentration (C_{SO_2}) equals:

7.061×10^{-5} .01023 (21.065-.03) 1000

$$C_{SO_2} = K_2 \frac{(N_{BaCl_2})(V_t - V_{tb})}{V_{m(std)}} \left(\frac{V_{soln}}{V_a}\right) =$$

RST

43.14

C_{SO_2} = = 3.5221×10^{-4} lbs/ds

Approved By: Gary H. Revlitt Date: 8/20/80
Gary H. Revlett, Ph.D.
Analytical Chemist

KENVIRONS, INC.
EPA METHOD 6 LABORATORY
DATA SHEET FOR SO_2 CONCENTRATION

Client Batell (LGE) Project No. 80019

Run No. ESP-A-9 Analysis Date July 31 Analysis by Pal R

Barium Chloride Standardization

ormality of H_2SO_4 Standard: Titration; #1 ____ N, #2 ____ N, #3 ____

Milliliters of Standard H_2SO_4 Used: Titration; #1 ____ ml, #2 ____ ml, #3 ____

illiliters of $BaCl_2$ Titrant Used: Titration; #1 ____ ml, #2 ____ ml, #3 ____

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

ormality of $BaCl_2$ Titrant equals: Titration; #1 ____, #2 ____, #3 ____

N = $BaCl_2$ Average Normality = .01023 N

Same as ESP-A-7

Sulfur Dioxide Blank

isual Observations: By:

Sample No.: 3141 Any Noted Sample Loss: ____

olume of Hydrogen Peroxide Blank Titrated: Titration; #1 1 ml, #2 1 m

Volume of $BaCl_2$ Titrant Used: Titration; #1 .02 ml, #2 .02 m

greement of Replicate titrations (must be within 1% or 0.2 ml): ____

b = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: .02 m

---

Sulfur Dioxide Sample

---

isual Observations: By:

mple No.: 3131 Any Noted Sample Loss:

tal Volume of SO_2 Sample (Vsoln) (should contain 100 ml.): 1000

olume of SO2 Sample Aliquot Titrated (Va) (should be 20 ml): 1

olume of $BaCl_2$ Titrant Used: Titration; #1 24.29 ml., #2 24.44

reement of Replicate Titrations (must be within 1% or 0.2 ml):

verage Volume of $BaCl_2$ Titrant Used, (Vt): 24.365

K_2 = grams SO2 per milliequivalent = 0.03203 g/meq
or
lbs. SO2 per milliequivalent = 7.061×10^{-5} lb/meq

(std) = Volume of gas sampled (corrected to standard conditions from Method 6 Field
rm = 41.99 ds

Sulfur Dioxide Concentration (C_{SO_2}) equals:

$$C_{SO_2} = \overset{7.061\times10^{-5}}{K_2}\ \frac{\overset{.01023}{(N_{BaCl_2})}\overset{(24.365-.02)}{(V_t - V_{tb})}\left(\frac{V_{soln}}{V_a}\right)^{\frac{1000}{1}}}{V_{m(std)}} =$$

RST

$$C_{SO_2} = \frac{}{4199} = \underline{4.1879\times10^{-4}}\ \text{lbs/dsc}$$

Approved By: Gary H. Revlett Date: 8/20/80
Gary H. Revlett, Ph.D.
Analytical Chemist

KENVIRONS, INC.
EPA METHOD 6 LABORATORY
DATA SHEET FOR SO_2 CONCENTRATION

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Client Betell (LGE) Project No. 80019

Run No. ESP-A-10 Analysis Date July 31 Analysis by Pal Ray

Barium Chloride Standardization

ormality of H_2SO_4 Standard: Titration; #1 ______ N, #2 ______ N, #3 ______

Milliliters of Standard H_2SO_4 Used: Titration; #1 ______ ml., #2 ______ ml., #3 ______

illiliters of $BaCl_2$ Titrant Used: Titration; #1 ______ ml., #2 ______ ml., #3 ______

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

ormality of $BaCl_2$ Titrant equals: Titration; #1 ______, #2 ______, #3 ______

N = $BaCl_2$ Average Normality = .01023 N

Same as ESP-A-7

Sulfur Dioxide Blank

sual Observations: ______ By: ______

ample No.: 3152 Any Noted Sample Loss: ______

lume of Hydrogen Peroxide Blank Titrated: Titration; #1 1 ml., #2 1 m

olume of $BaCl_2$ Titrant Used: Titration; #1 .04 ml., #2 .04 ml

greement of Replicate titrations (must be within 1% or 0.2 ml.): ______

b = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: .04 ml

Sulfur Dioxide Sample

95

isual Observations: By:

mple No.: 3148 Any Noted Sample Loss:

tal Volume of SO_2 Sample (Vsoln) (should contain 100 ml.): 1000

olume of SO_2 Sample Aliquot Titrated (Va) (should be 20 ml.): 1

olume of $BaCl_2$ Titrant Used: Titration; #1 22.87 ml., #2 22.80

reement of Replicate Titrations (must be within 1% or 0.2 ml.):

verage Volume of $BaCl_2$ Titrant Used, (Vt): 22.835

K_2 = grams SO_2 per milliequivalent = 0.03203 g/meq

or

lbs. SO_2 per milliequivalent = 7.061×10^{-5} lb/meq

(std) = Volume of gas sampled (corrected to standard conditions from Method 6 Field

m = 41.18 ds

Sulfur Dioxide Concentration (C_{SO_2}) equals:

7.061x10-5 .01023 (22.835-.04) 1000/1

$$C_{SO_2} = K_2 \frac{(N_{BaCl_2})(V_t - V_{tb})}{V_m(std)} \left(\frac{V_{soln}}{V_a}\right) =$$

41.18

RST

C_{SO_2} = 5.9979 x 10-4 lbs/dsc

Approved By: Gary H. Revlett Date: 8/20/80
Gary H. Revlett, Ph.D.
Analytical Chemist

ESP-B-(1-10)

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KENVIRONS, INC.
EPA METHOD 6 LABORATORY
DATA SHEET FOR SO_2 CONCENTRATION

Client Bedell (LGE) Project No. 80019

Run No. ESP-B-1 Analysis Date July 30 Analysis by Pal Rup

Barium Chloride Standardization

ormality of H_2SO_4 Standard: Titration; #1 ____ N, #2 ____ N, #3 ____

Milliliters of Standard H_2SO_4 Used: Titration; #1 ____ ml, #2 ____ ml, #3 ____

..illiliters of $BaCl_2$ Titrant Used: Titration; #1 ____ ml, #2 ____ ml, #3 ____

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

'ormality of $BaCl_2$ Titrant equals: Titration; #1 ____, #2 ____, #3 ____

N = $BaCl_2$ Average Normality = .01021 N

Same as ESP-A-1

Sulfur Dioxide Blank

sual Observations: from ESP-A-1 By: ____

ample No.: 3018 Any Noted Sample Loss: ____

lume of Hydrogen Peroxide Blank Titrated: Titration; #1 1 ml, #2 1 m

'olume of $BaCl_2$ Titrant Used: Titration; #1 .02 ml, #2 .02 m

greement of Replicate titrations (must be within 1% or 0.2 ml): ____

b = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: .02 m

9

Sulfur Dioxide Sample

isual Observations: By:

mple No.: 3017 Any Noted Sample Loss:

tal Volume of SO_2 Sample (Vsoln) (should contain 100 ml.): 1000

olume of SO_2 Sample Aliquot Titrated (Va) (should be 20 ml): 1

olume of $BaCl_2$ Titrant Used: Titration; #1 24.21 ml. #2 24.12

reement of Replicate Titrations (must be within 1% or 0.2 ml):

verage Volume of $BaCl_2$ Titrant Used, (Vt): 24.165

K_2 = grams SO_2 per milliequivalent = 0.03203 g/meq
or
lbs. SO_2 per milliequivalent = 7.061×10^{-5} lb/meq

(std) = Volume of gas sampled (corrected to standard conditions from Method 6 Field
m = 45.07 ds

Sulfur Dioxide Concentration (C_{SO_2}) equals:

$$C_{SO_2} = \overset{7.061\times10^{-5}}{K_2}\ \frac{\overset{.01021}{(N_{BaCl_2})}\overset{(24.165-.02)}{(V_t - V_{tb})}}{\underset{4507}{V_{m(std)}}}\left(\frac{V_{soln}}{V_a}\right)^{\frac{1000}{1}} =$$

RST

C_{SO_2} = = 38621×10^{-4} lbs/ds

Approved By: Gary H. Revlett Date: 8/20/80
Gary H. Revlett, Ph.D.
Analytical Chemist

KENVIRONS, INC.
EPA METHOD 6 LABORATORY
DATA SHEET FOR SO_2 CONCENTRATION

Client Betell (LGE) Project No. R0019
Run No. ESP B-2 Analysis Date July 30 Analysis by Pal Rup

Barium Chloride Standardization

rmality of H_2SO_4 Standard: Titration; #1 ______ N, #2 ______ N, #3 ______
illiliters of Standard H_2SO_4 Used: Titration; #1 ______ ml, #2 ______ ml, #3 ______
Milliliters of $BaCl_2$ Titrant Used: Titration; #1 ______ ml, #2 ______ ml, #3 ______

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

rmality of $BaCl_2$ Titrant equals: Titration; #1 ______, #2 ______, #3 ______
N = $BaCl_2$ Average Normality = .01021 N
Same as ESP-A-1

Sulfur Dioxide Blank

isual Observations: from ESP-A-2 By:
Sample No.: 3036 Any Noted Sample Loss: ______
lume of Hydrogen Peroxide Blank Titrated: Titration; #1 1 ml, #2 1 m
lume of $BaCl_2$ Titrant Used: Titration; #1 .02 ml, #2 .02 m
Agreement of Replicate titrations (must be within 1% or 0.2 ml.): ______
tb = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: .02 m

09

Sulfur Dioxide Sample

/isual Observations: By:

; mple No.: 3035 Any Noted Sample Loss:

tal Volume of SO_2 Sample (Vsoln) (should contain 100 ml.): 1000

'olume of SO2 Sample Aliquot Titrated (Va) (should be 20 ml.): 1

'olume of $BaCl_2$ Titrant Used: Titration; #1 21.90 ml. #2 21.79

reement of Replicate Titrations (must be within 1% or 0.2 ml):

verage Volume of $BaCl_2$ Titrant Used, (Vt): 21.45

K_2= grams SO2 per milliequivalent = 0.03203 g/meq
or
lbs. SO2 per milliequivalent = 7.061×10^{-5} lb/meq

'std) = Volume of gas sampled (corrected to standard conditions from Method 6 Field
m = 42.81 ds

Sulfur Dioxide Concentration (C_{SO_2}) equals:

7.061×10^{-5} .01021 (21.45 - .02)

$$C_{SO_2} = K_2 \frac{(N_{BaCl_2})(Vt - Vtb)}{Vm(std)} \left(\frac{Vsoln}{Va}\right) \frac{1000}{1} =$$

42.81

RST

C_{SO_2} = 3.6088×10^{-4} lbs/dsc

Approved By: Gary H. Revlett Date: 8/20/80
Gary H. Revlett, Ph.D.
Analytical Chemist

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KENVIRONS, INC.
EPA METHOD 6 LABORATORY
DATA SHEET FOR SO_2 CONCENTRATION

Client Bectell (LGE) Project No. 80019

Run No. ESP-B-3 Analysis Date July 30 Analysis by Pal Rung

Barium Chloride Standardization

ormality of H_2SO_4 Standard: Titration; #1 ______ N, #2 ______ N, #3 ______

milliliters of Standard H_2SO_4 Used: Titration; #1 ______ ml, #2 ______ ml, #3 ______

illiliters of $BaCl_2$ Titrant Used: Titration; #1 ______ ml, #2 ______ ml, #3 ______

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

Normality of $BaCl_2$ Titrant equals: Titration; #1 ______, #2 ______, #3 ______

N = $BaCl_2$ Average Normality = .01021 N

Same as ESP-A-1

Sulfur Dioxide Blank

Visual Observations: from ESP-A-3 By: ______

mple No.: 3055 Any Noted Sample Loss: ______

Volume of Hydrogen Peroxide Blank Titrated: Titration; #1 1 ml; #2 1 ml

Volume of $BaCl_2$ Titrant Used: Titration; #1 .04 ml, #2 .02 ml

reement of Replicate titrations (must be within 1% or 0.2 ml): ______

Vtb = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: .03 ml

D'

Sulfur Dioxide Sample

isual Observations: By:

mple No.: -3046 Any Noted Sample Loss:

tal Volume of SO_2 Sample (Vsoln) (should contain 100 ml.): 1000

lume of SO_2 Sample Aliquot Titrated (Va) (should be 20 ml.): 1

olume of $BaCl_2$ Titrant Used: Titration; #1 25.66 ml., #2 25.61

eement of Replicate Titrations (must be within 1% or 0.2 ml):

verage Volume of $BaCl_2$ Titrant Used, (Vt): 25.635

K_2 = grams SO_2 per milliequivalent = 0.03203 g/meq

or

lbs. SO_2 per milliequivalent = 7.061×10^{-5} lb/meq

std) = Volume of gas sampled (corrected to standard conditions from Method 6 Field

m = 48.56 ds

Sulfur Dioxide Concentration (C_{SO_2}) equals:

7.061×10^{-5} .01021 (25.635 − .03)

$$C_{SO_2} = K_2 \frac{(N_{BaCl_2})(V_t - V_{tb})\left(\frac{V_{soln}}{V_a}\right)}{V_{m(std)}} \quad \frac{1000}{1} =$$

48.56

RST

C_{SO_2} = = 3.8013×10^{-4} lbs/ds

Approved By: Gary R. Revlett Date: 8/20/80

Gary W. Revlett, Ph.D.
Analytical Chemist

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KENVIRONS, INC.
EPA METHOD 6 LABORATORY
DATA SHEET FOR SO_2 CONCENTRATION

Client Batell (LG&E) Project No. 90019

Run No. ESP-B4 Analysis Date July 30 Analysis by Val Rng

Barium Chloride Standardization

ormality of H_2SO_4 Standard: Titration; #1 ______ N, #2 ______ N, #3 ______

Milliliters of Standard H_2SO_4 Used: Titration; #1 ______ ml., #2 ______ ml., #3 ______

illiliters of $BaCl_2$ Titrant Used: Titration; #1 ______ ml., #2 ______ ml., #3 ______

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

ormality of $BaCl_2$ Titrant equals: Titration; #1 ______, #2 ______, #3 ______

N = $BaCl_2$ Average Normality = .01021 N

Same as ESP-A-1

Sulfur Dioxide Blank

sual Observations: from ESP-A-4 By: ______

Sample No.: ~~[illegible]~~ 3066 Any Noted Sample Loss: ______

lume of Hydrogen Peroxide Blank Titrated: Titration; #1 1 ml., #2 1 m

lume of $BaCl_2$ Titrant Used: Titration; #1 .04 ml., #2 .04 m

Agreement of Replicate titrations (must be within 1% or 0.2 ml.): ______

b = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: .04 m

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Sulfur Dioxide Sample

isual Observations:

By:

aple No.: 3062 Any Hoted Sample Loss:

tal Volume of SO_2 Sample (Vsoln) (should contain 100 ml.): 1000

olume of SO2 Sample Aliquot Titrated (Va) (should be 20 ml): 1

olume of $BaCl_2$ Titrant Used: Titration; #1 24.12 ml., #2 24.24

eement of Replicate Titrations (must be within 1% or 0.2 ml):

verage Volume of $BaCl_2$ Titrant Used, (Vt): 24.18

K_2 = grams SO2 per milliequivalent = 0.03203 g/meq
or
lbs. SO2 per milliequivalent = 7.061×10^{-5} lb/meq

std) = Volume of gas sampled (corrected to standard conditions from Method 6 Field
m = 42.40 dsc

Sulfur Dioxide Concentration (C_{SO_2}) equals:

$$C_{SO_2} = \overset{7.061\times10^{-5}}{K_2}\ \frac{\overset{.01021}{(N_{BaCl_2})}\overset{(24.18-.04)}{(V_t - V_{tb})}}{\underset{42.40}{V_{m(std)}}} \left(\frac{V_{soln}}{V_a}\right) \frac{1000}{1} =$$

RST

C_{SO_2} = = 4.1045×10^{-4} lbs/dsc

Approved By: Gary H. Revlett Date: 8/20/80
Gary H. Revlett, Ph.D.
Analytical Chemist

KENVIRONS, INC.
EPA METHOD 6 LABORATORY
DATA SHEET FOR SO_2 CONCENTRATION

Client Battell (LGE) Project No. 80019
Run No. ESP-B-5 Analysis Date July 30 Analysis by

Barium Chloride Standardization

Normality of H_2SO_4 Standard: Titration; #1 ____ N, #2 ____ N, #3 ____
Milliliters of Standard H_2SO_4 Used: Titration; #1 ____ ml, #2 ____ ml, #3 ____
Milliliters of $BaCl_2$ Titrant Used: Titration; #1 ____ ml, #2 ____ ml, #3 ____

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

Normality of $BaCl_2$ Titrant equals: Titration; #1 ____, #2 ____, #3 ____
$N = BaCl_2$ Average Normality = .01621 N
Same as ESP-A-1

Sulfur Dioxide Blank

isual Observations: from ESP-A-5 By:
Sample No.: 3083 Any Noted Sample Loss:
olume of Hydrogen Peroxide Blank Titrated: Titration; #1 1 ml; #2 1 m
Volume of $BaCl_2$ Titrant Used: Titration; #1 .02 ml, #2 .02 m
Agreement of Replicate titrations (must be within 1% or 0.2 ml.):
tb = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: .02 m

RS

Sulfur Dioxide Sample

isual Observations: By:

mple No.: 3076 Any Noted Sample Loss:

tal Volume of SO_2 Sample (Vsoln) (should contain 100 ml.): 1000

olume of SO_2 Sample Aliquot Titrated (Va) (should be 20 ml.): 1

olume of $BaCl_2$ Titrant Used: Titration; #1 23.22 ml., #2 23.08

reement of Replicate Titrations (must be within 1% or 0.2 ml.):

verage Volume of $BaCl_2$ Titrant Used, (Vt): 23.15

K_2 = grams SO_2 per milliequivalent = 0.03203 g/meq

or

lbs. SO_2 per milliequivalent = 7.061×10^{-5} lb/meq

'std) = Volume of gas sampled (corrected to standard conditions from Method 6 Field

= 41.82 ds

Sulfur Dioxide Concentration (C_{SO_2}) equals:

$$C_{SO_2} = \overset{7.061\times10^{-5}}{K_2}\ \frac{\overset{.01021}{(N_{BaCl_2})}\overset{(23.15-.02)}{(V_t - V_{tb})}}{V_m(std)} \left(\frac{V_{soln}}{V_a}\right)\frac{1000}{1} =$$

RST

C_{SO_2} = 41.82 = 39873 X 10^{-4} lbs/ds

Approved By: Gary H. Revlett Date: 8/20/88
Gary H. Revlett, Ph.D.
Analytical Chemist

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KENVIRONS, INC.
EPA METHOD 6 LABORATORY
DATA SHEET FOR SO_2 CONCENTRATION

Client Bechtel (LGE) Project No. 80019

Run No. ESP-B-1a Analysis Date July 30 Analysis by

Barium Chloride Standardization

ormality of H_2SO_4 Standard: Titration; #1 ____ N, #2 ____ N, #3 ____

Milliliters of Standard H_2SO_4 Used: Titration; #1 ____ ml, #2 ____ ml, #3 ____

illiliters of $BaCl_2$ Titrant Used: Titration; #1 ____ ml, #2 ____ ml, #3 ____

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

rmality of $BaCl_2$ Titrant equals: Titration; #1 ____, #2 ____, #3 ____

N = $BaCl_2$ Average Normality = .01021 N

Same as ESP-A-1

Sulfur Dioxide Blank

sual Observations: from ESP-A-6 By:

ample No.: 3095 Any Noted Sample Loss:

lume of Hydrogen Peroxide Blank Titrated: Titration; #1 1 ml, #2 1 m

lume of $BaCl_2$ Titrant Used: Titration; #1 .02 ml, #2 .02 m

greement of Replicate titrations (must be within 1% or 0.2 ml): ____

= Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: .02 ml

KENVIRONS, INC.
EPA METHOD 6 LABORATORY
DATA SHEET FOR SO_2 CONCENTRATION

Client Batell (LGE) Project No. 80019

Run No. ESP- B-7 Analysis Date July 31 Analysis by Pal Roy

Barium Chloride Standardization

ormality of H_2SO_4 Standard: Titration; #1 ____ N, #2 ____ N, #3 ____

Milliliters of Standard H_2SO_4 Used: Titration; #1 ____ ml, #2 ____ ml, #3 ____

illiliters of $BaCl_2$ Titrant Used: Titration; #1 ____ ml, #2 ____ ml, #3 ____

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

ormality of $BaCl_2$ Titrant equals: Titration; #1 ____, #2 ____, #3 ____

N = $BaCl_2$ Average Normality = .01023 N

Same as ESP-A-7

Sulfur Dioxide Blank

sual Observations: from ESP-A-7 By:

Sample No.: 3/13 Any Noted Sample Loss: ____

lume of Hydrogen Peroxide Blank Titrated: Titration; #1 1 ml, #2 1 m

Volume of $BaCl_2$ Titrant Used: Titration; #1 .02 ml, #2 .02 ml

greement of Replicate titrations (must be within 1% or 0.2 ml.): ____

= Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: .02 ml

1:8

Sulfur Dioxide Sample

Visual Observations: By:

ample No.: 3104 Any Noted Sample Loss:

otal Volume of SO_2 Sample (Vsoln) (should contain 100 ml.): 1000

olume of SO_2 Sample Aliquot Titrated (Va) (should be 20 ml.): 1

Volume of $BaCl_2$ Titrant Used: Titration; #1 17.59 ml., #2 17.55

reement of Replicate Titrations (must be within 1% or 0.2 ml.):

verage Volume of $BaCl_2$ Titrant Used, (Vt): 17.57

K_2 = grams SO_2 per milliequivalent = 0.03203 g/meq

or

lbs. SO_2 per milliequivalent = 7.061×10^{-5} lb/meq

(std) = Volume of gas sampled (corrected to standard conditions from Method 6 Field
rm = 37.65 ds

Sulfur Dioxide Concentration (C_{SO_2}) equals:

$$C_{SO_2} = \overset{7.061\times10^{-5}}{K_2}\ \frac{\overset{.01023}{(N_{BaCl_2})}\overset{(17.57-.02)}{(Vt - Vtb)}}{Vm(std)} \left(\frac{Vsoln}{Va}\right)^{\frac{1000}{1}} =$$

RST

$$C_{SO_2} = \frac{}{37.65} = 33670 \times 10^{-4}\ \text{lbs/ds}$$

Approved By: Gary H. Revlett Date: 8/20/80
Gary H. Revlett, Ph.D.
Analytical Chemist

1:9

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EPA METHOD 6 LABORATORY
DATA SHEET FOR SO_2 CONCENTRATION

Client Bedell (LGE) Project No. 80019
Run No. ESP-B-8 Analysis Date July 31 Analysis by Paul

Barium Chloride Standardization

rmality of H_2SO_4 Standard: Titration; #1 ____ N, #2 ____ N, #3 ____
illiliters of Standard H_2SO_4 Used: Titration; #1 ____ ml, #2 ____ ml, #3 ____ m
.lliliters of $BaCl_2$ Titrant Used: Titration; #1 ____ ml, #2 ____ ml, #3 ____ m

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

--mality of $BaCl_2$ Titrant equals: Titration; #1 ____, #2 ____, #3 ____
N = $BaCl_2$ Average Normality = .01023 N
Same as ESP-A-7

Sulfur Dioxide Blank

.ual Observations: By:
ample No.: from ESP-A-6 (3/28) Any Noted Sample Loss: ____
ume of Hydrogen Peroxide Blank Titrated: Titration; #1 1 ml.; #2 1 ml.
-lume of $BaCl_2$ Titrant Used: Titration; #1 .02 ml, #2 .02 ml.
jreement of Replicate titrations (must be within 1% or 0.2 ml.): ____
: = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: .02 ml.

Sulfur Dioxide Sample

Visual Observations: By:

mple No.: 3116 Any Noted Sample Loss:

tal Volume of SO_2 Sample (Vsoln) (should contain 100 ml.): 1000

Volume of SO_2 Sample Aliquot Titrated (Va) (should be 20 ml): 1

Volume of $BaCl_2$ Titrant Used: Titration; #1 ~~[illegible]~~ 19.62 ml, #2 19.74

reement of Replicate Titrations (must be within 1% or 0.2 ml):

verage Volume of $BaCl_2$ Titrant Used, (Vt): 19.68

K_2 = grams SO_2 per milliequivalent = 0.03203 g/meq
or
lbs. SO_2 per milliequivalent = 7.061×10^{-5} lb/meq

(std) = Volume of gas sampled (corrected to standard conditions from Method 6 Field
rm = 40.89 ds

Sulfur Dioxide Concentration (C_{SO_2}) equals:

$$C_{SO_2} = \overset{7.061\times10^{-5}}{K_2}\ \frac{\overset{.01023}{(N_{BaCl_2})}\overset{(19.68 - .02)}{(V_t - V_{tb})}}{\underset{40.89}{V_m(std)}} \left(\frac{V_{soln}}{V_a}\right)\frac{1000}{1} =$$

PST

C_{SO_2} = = 3.4730×10^{-4} lbs/ds

Approved By: Gary H. Revlett Date: 8/20/80
Gary H. Revlett, Ph.D.
Analytical Chemist

KENVIRONS, INC.
EPA METHOD 6 LABORATORY
DATA SHEET FOR SO_2 CONCENTRATION

Client Batell (LGE)

Run No. ESP-B-9 Analysis Date July 31 Analysis by Pal Rep Project No. 90019

Barium Chloride Standardization

ormality of H_2SO_4 Standard: Titration; #1 ___ N, #2 ___ N, #3 ___

Milliliters of Standard H_2SO_4 Used: Titration; #1 ___ ml, #2 ___ ml, #3 ___

nilliliters of $BaCl_2$ Titrant Used: Titration; #1 ___ ml, #2 ___ ml, #3 ___

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

ormality of $BaCl_2$ Titrant equals: Titration; #1 ___, #2 ___, #3 ___

N = $BaCl_2$ Average Normality = .01023 N

Same as ESP-A-7

Sulfur Dioxide Blank

isual Observations: from ESP-A-9 By:

Sample No.: 3141 Any Noted Sample Loss:

olume of Hydrogen Peroxide Blank Titrated: Titration; #1 1 ml; #2 1 ml

olume of $BaCl_2$ Titrant Used: Titration; #1 .02 ml, #2 .02 ml

greement of Replicate titrations (must be within 1% or 0.2 ml):

b = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: .02 ml

Sulfur Dioxide Sample

Visual Observations: By:

mple No.: 3133 Any Noted Sample Loss:

tal Volume of SO_2 Sample (Vsoln) (should contain 100 ml.): 1000

lume of SO_2 Sample Aliquot Titrated (Va) (should be 20 ml): 1

olume of $BaCl_2$ Titrant Used: Titration; #1 22.62 ml., #2 22.56

reement of Replicate Titrations (must be within 1% or 0.2 ml):

verage Volume of $BaCl_2$ Titrant Used, (Vt): 22.59

K_2 = grams SO_2 per milliequivalent = 0.03203 g/meq
or
lbs. SO_2 per milliequivalent = 7.061×10^{-5} lb/meq

(std) = Volume of gas sampled (corrected to standard conditions from Method 6 Field
= 40.17 ds

Sulfur Dioxide Concentration (C_{SO_2}) equals:

$$C_{SO_2} = \overset{7.061\times10^{-5}}{K_2}\ \frac{\overset{.01023}{(N_{BaCl_2})}\overset{(22.59-0)}{(V_t - V_{tb})}}{\underset{40.17}{V_{m(std)}}}\left(\frac{V_{soln}}{V_a}\right)^{1000/1} =$$

RS7

C_{SO_2} = = 4.0585×10^{-4} lbs/dsc

Approved By: Gary H. Revlett Date: 5/20/85
Gary H. Revlett, Ph.D.
Analytical Chemist

KENVIRONS, INC.
EPA METHOD 6 LABORATORY
DATA SHEET FOR SO_2 CONCENTRATION

Client Bedell (LGE) Project No. 80019

Run No. ESP-B-10 Analysis Date July 31 Analysis by Pal Rup

Barium Chloride Standardization

lormality of H_2SO_4 Standard: Titration; #1 ______ N, #2 ______ N, #3 ______

Milliliters of Standard H_2SO_4 Used: Titration; #1 ______ ml, #2 ______ ml, #3 ______

.Hilliliters of $BaCl_2$ Titrant Used: Titration; #1 ______ ml, #2 ______ ml, #3 ______

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

'ormality of $BaCl_2$ Titrant equals: Titration; #1 ______, #2 ______, #3 ______

N = $BaCl_2$ Average Normality = .01023 N

Same as ESP-A-7

Sulfur Dioxide Blank

isual Observations: from ESP-A-10 By:

Sample No.: 315 2 Any Noted Sample Loss:

olume of Hydrogen Peroxide Blank Titrated: Titration; #1 1 ml, #2 1 m

'olume of $BaCl_2$ Titrant Used: Titration; #1 .04 ml, #2 .04 m

greement of Replicate titrations (must be within 1% or 0.2 ml): ______

b = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: .04 m

STK-(1-10)

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EPA METHOD 6 LABORATORY
DATA SHEET FOR SO_2 CONCENTRATION

Client Batell (LGE) Project No. 80019

Run No. STK-1 Analysis Date July 29 Analysis by Pal Rup

Barium Chloride Standardization

Normality of H_2SO_4 Standard: Titration; #1 .0100 N, #2 .0100 N, #3 .0100

Milliliters of Standard H_2SO_4 Used: Titration; #1 20 ml., #2 20 ml., #3 20

Milliliters of $BaCl_2$ Titrant Used: Titration; #1 19.66 ml., #2 19.75 ml., #3 19.65

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

Normality of $BaCl_2$ Titrant equals: Titration; #1 .01017, #2 .01013, #3 .01018

N = $BaCl_2$ Average Normality = .01016 N

Sulfur Dioxide Blank

Visual Observations: By:

Sample No.: 3019 Any Noted Sample Loss: No

Volume of Hydrogen Peroxide Blank Titrated: Titration; #1 20 ml., #2 20 m

Volume of $BaCl_2$ Titrant Used: Titration; #1 .01 ml., #2 .01 m

Agreement of Replicate titrations (must be within 1% or 0.2 ml.):

tb = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: .01 m

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Sulfur Dioxide Sample

isual Observations: By:

mple No.: 3015 Any Noted Sample Loss:

tal Volume of SO_2 Sample (Vsoln) (should contain 100 ml.): 1000

olume of SO_2 Sample Aliquot Titrated (Va) (should be 20 ml.): 10

ulume of $BaCl_2$ Titrant Used: Titration; #1 9.52 ml., #2 9.55

reement of Replicate Titrations (must be within 1% or 0.2 ml.):

verage Volume of $BaCl_2$ Titrant Used, (Vt): 9.535

K_2= grams SO_2 per milliequivalent = 0.03203 g/meq
or
lbs. SO_2 per milliequivalent = 7.061 x 10^{-5} lb/meq

(std) = Volume of gas sampled (corrected to standard conditions from Method 6 Field
rm = 33.34 ds

Sulfur Dioxide Concentration (C_{SO_2}) equals:

$$C_{SO_2} = \overset{7.061\times10^{-5}}{K_2}\ \frac{\overset{.01016}{(N_{BaCl_2})}\overset{(9.535-.01)}{(V_t - V_{tb})}}{\underset{33.34}{V_{m(std)}}}\left(\frac{V_{soln}}{V_a}\right)^{1000}_{10} = $$

RST

2.0495 x10^{-5}

C_{SO_2} = = lbs/dsc

Approved By: Gary H. Revlett Date: 8/20/80
Gary H. Revlett, Ph.D.
Analytical Chemist

KENVIRONS, INC.
EPA METHOD 6 LABORATORY
DATA SHEET FOR SO_2 CONCENTRATION

Client Bectell (LGE) Project No. 80019

Run No. STK-2 Analysis Date July 29 Analysis by Pal Rep

Barium Chloride Standardization

Normality of H_2SO_4 Standard: Titration; #1 ____ N, #2 ____ N, #3 ____

Milliliters of Standard H_2SO_4 Used: Titration; #1 ____ ml., #2 ____ ml., #3 ____

Milliliters of $BaCl_2$ Titrant Used: Titration; #1 ____ ml., #2 ____ ml., #3 ____

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

Normality of $BaCl_2$ Titrant equals: Titration; #1 ____, #2 ____, #3 ____

N = $BaCl_2$ Average Normality = .01016 N

from STK-1

Sulfur Dioxide Blank

isual Observations:

By:

Sample No.: 3033 Any Noted Sample Loss: ____

olume of Hydrogen Peroxide Blank Titrated: Titration; #1 10 ml., #2 10 m

Volume of $BaCl_2$ Titrant Used: Titration; #1 .02 ml., #2 .01 m

greement of Replicate titrations (must be within 1% or 0.2 ml.): ____

tb = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: .015 m

Sulfur Dioxide Sample

Visual Observations:

By:

mple No.: 3032 Any Noted Sample Loss:

otal Volume of SO_2 Sample (Vsoln) (should contain 100 ml.): 1000

Volume of SO2 Sample Aliquot Titrated (Va) (should be 20 ml.): 10

olume of $BaCl_2$ Titrant Used: Titration; #1 13.26 ml., #2 13.28

reement of Replicate Titrations (must be within 1% or 0.2 ml):

verage Volume of $BaCl_2$ Titrant Used, (Vt): 13.27

K_2= grams SO2 per milliequivalent = 0.03203 g/meq
or
lbs. SO2 per milliequivalent = 7.061×10^{-5} lb/meq

(std) = Volume of gas sampled (corrected to standard conditions from Method 6 Field
rm = 35.14 ds

Sulfur Dioxide Concentration (C_{SO_2}) equals:

$$\overset{7.061\times10^{-5}}{C_{SO_2} = K_2} \frac{\overset{.01016}{(N_{BaCl_2})}\overset{(13.27-.015)}{(V_t - V_{tb})}}{\underset{35.14}{V_{m(std)}}} \left(\frac{V_{soln}}{V_a}\right)\frac{1000}{10} =$$

RST

C_{SO_2} = = 2.7060×10^{-5} lbs/dsc

Approved By: Gary H. Revlett Date: 8/20/80
Gary H. Revlett, Ph.D.
Analytical Chemist

KENVIRONS, INC.
EPA METHOD 6 LABORATORY
DATA SHEET FOR SO_2 CONCENTRATION

Client Bectell (LGE) Project No. 80019
Run No. STK-3 Analysis Date ____ Analysis by ____

Barium Chloride Standardization

Normality of H_2SO_4 Standard: Titration; #1 ____ N, #2 ____ N, #3 ____
Milliliters of Standard H_2SO_4 Used: Titration; #1 ____ ml., #2 ____ ml., #3 ____
Milliliters of $BaCl_2$ Titrant Used: Titration; #1 ____ ml., #2 ____ ml., #3 ____

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

Normality of $BaCl_2$ Titrant equals: Titration; #1 ____, #2 ____, #3 ____
N = $BaCl_2$ Average Normality = .01016 N
from STK-1

Sulfur Dioxide Blank

Visual Observations: By:
Sample No.: 3054 Any Noted Sample Loss: ____
Volume of Hydrogen Peroxide Blank Titrated: Titration; #1 10 ml., #2 10 m
Volume of $BaCl_2$ Titrant Used: Titration; #1 .26 ml., #2 .28 m
Agreement of Replicate titrations (must be within 1% or 0.2 ml.): ____
tb = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: .27 m

Sulfur Dioxide Sample

isual Observations: By:

mple No.: 3053 Any Noted Sample Loss:

tal Volume of SO_2 Sample (Vsoln) (should contain 100 ml.): 1000

olume of SO2 Sample Aliquot Titrated (Va) (should be 20 ml): 10

olume of $BaCl_2$ Titrant Used: Titration; #1 11.79 ml. #2 11.80

reement of Replicate Titrations (must be within 1% or 0.2 ml):

verage Volume of $BaCl_2$ Titrant Used, (Vt): 11.795

K_2 = grams SO2 per milliequivalent = 0.03203 g/meq
or
lbs. SO2 per milliequivalent = 7.061×10^{-5} lb/meq

(std) = Volume of gas sampled (corrected to standard conditions from Method 6 Field
rm = 32.32 ds

Sulfur Dioxide Concentration (C_{SO_2}) equals:

$$C_{SO_2} = \overset{7.061\times10^{-5}}{K_2}\ \frac{\overset{.01016}{(N_{BaCl_2})}\overset{(11.795-.37)}{(V_t - V_{tb})}\left(\frac{V_{soln}}{V_a}\right)}{\underset{32.32}{V_m(std)}}\ \frac{1000}{10} =$$

RST

C_{SO_2} = = 2.5581×10^{-5} lbs/ds

Approved By: Gary H. Revlett Date: 8/20/80
Gary H. Revlett, Ph.D.
Analytical Chemist

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KENVIRONS, INC.
EPA METHOD 6 LABORATORY
DATA SHEET FOR SO_2 CONCENTRATION

Client Bectell (LGE) Project No. 80019

Run No. STK-4 Analysis Date ____________ Analysis by ____________

Barium Chloride Standardization

Normality of H_2SO_4 Standard: Titration; #1 ______ N, #2 ______ N, #3 ______

Milliliters of Standard H_2SO_4 Used: Titration; #1 ______ ml, #2 ______ ml, #3 ______

Milliliters of $BaCl_2$ Titrant Used: Titration; #1 ______ ml, #2 ______ ml, #3 ______

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

Normality of $BaCl_2$ Titrant equals: Titration; #1 ______, #2 ______, #3 ______

N = $BaCl_2$ Average Normality = .01016 N
from STK-1

Sulfur Dioxide Blank

Visual Observations: By:

Sample No.: 3067 Any Noted Sample Loss: ______

Volume of Hydrogen Peroxide Blank Titrated: Titration; #1 10 ml, #2 10 m

Volume of $BaCl_2$ Titrant Used: Titration; #1 .01 ml, #2 .02 m

Agreement of Replicate titrations (must be within 1% or 0.2 ml): ______

tb = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: .015 m

Sulfur Dioxide Sample

isual Observations:

By:

mple No.: 3070 Any Noted Sample Loss:

tal Volume of SO_2 Sample (Vsoln) (should contain 100 ml.): 1000

olume of SO_2 Sample Aliquot Titrated (Va) (should be 20 ml): 10

ulume of $BaCl_2$ Titrant Used: Titration; #1 11.65 ml. #2 11.62

reement of Replicate Titrations (must be within 1% or 0.2 ml):

verage Volume of $BaCl_2$ Titrant Used, (Vt): 11.635

K_2 = grams SO_2 per milliequivalent = 0.03203 g/meq

or

lbs. SO_2 per milliequivalent = 7.061×10^{-5} lb/meq

(std) = Volume of gas sampled (corrected to standard conditions from Method 6 Field

m = 31.64 ds

Sulfur Dioxide Concentration (C_{SO_2}) equals:

7.061×10^{-5} .01016 (11.635 - .015)

$$C_{SO_2} = K_2 \frac{(N_{BaCl_2})(V_t - V_{tb})}{V_m(std)} \left(\frac{V_{soln}}{V_a}\right) \frac{1000}{10}$$

31.64

RST

C_{SO_2} = = = 2.6305×10^{-5} lbs/dsc

Approved By: Gary H. Revlett Date: 8/20/80

Gary H. Revlett, Ph.D.

Analytical Chemist

KENVIRONS, INC.
EPA METHOD 6 LABORATORY
DATA SHEET FOR SO_2 CONCENTRATION

Client Battell (LGE) Project No. 80019

Run No. STK-5 Analysis Date July 30 Analysis by

Barium Chloride Standardization

Normality of H_2SO_4 Standard: Titration; #1 .0100 N, #2 .0100 N, #3 .0100

Milliliters of Standard H_2SO_4 Used: Titration; #1 20 ml., #2 20 ml., #3 20

Milliliters of $BaCl_2$ Titrant Used: Titration; #1 19.54 ml., #2 19.56 ml., #3 19.56

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

Normality of $BaCl_2$ Titrant equals: Titration; #1 .01024, #2 .01022, #3 .0102

N = $BaCl_2$ Average Normality = .01023 N

Sulfur Dioxide Blank

Visual Observations:

By:

Sample No.: 3082 Any Noted Sample Loss:

Volume of Hydrogen Peroxide Blank Titrated: Titration; #1 10 ml., #2 10 m

Volume of $BaCl_2$ Titrant Used: Titration; #1 .01 ml., #2 .01 m

Agreement of Replicate titrations (must be within 1% or 0.2 ml.):

Vb = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: .01 m

---

Sulfur Dioxide Sample

Visual Observations:

By:

mple No.: 3080 Any Noted Sample Loss:

otal Volume of SO_2 Sample (Vsoln) (should contain 100 ml.): 1000

Volume of SO_2 Sample Aliquot Titrated (Va) (should be 20 ml.): 10

volume of $BaCl_2$ Titrant Used: Titration; #1 9.87 ml, #2 9.84

greement of Replicate Titrations (must be within 1% or 0.2 ml):

Average Volume of $BaCl_2$ Titrant Used, (Vt): 9.855 JD

K_2 = grams SO_2 per milliequivalent = 0.03203 g/meq

or

lbs. SO_2 per milliequivalent = 7.061×10^{-5} lb/meq

(std) = Volume of gas sampled (corrected to standard conditions from Method 6 Field
rm = 31.32 ds

Sulfur Dioxide Concentration (C_{SO_2}) equals:

$$C_{SO_2} = \overset{7061\times10^{-5}}{K_2}\,\frac{\overset{.01023}{(N_{BaCl_2})}\overset{(9.855-.01)}{(V_t - V_{tb})}}{\underset{31.32}{V_m(std)}}\left(\frac{V_{soln}}{V_a}\right)\frac{1000}{10}$$

RST

= 2.2705 x10^-5

C_{SO_2} = [illegible] lbs/ds

Approved By: Gary H. Revlett Date: 8/20/80
Gary H. Revlett, Ph.D.
Analytical Chemist

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KENVIRONS, INC.
EPA METHOD 6 LABORATORY
DATA SHEET FOR SO_2 CONCENTRATION

Client Bactell (LGE) Project No. 80019
Run No. STK-6 Analysis Date July 30 Analysis by

Barium Chloride Standardization

ormality of H_2SO_4 Standard: Titration; #1 ____ N, #2 ____ N, #3 ____
Milliliters of Standard H_2SO_4 Used: Titration; #1 ____ ml, #2 ____ ml, #3 ____
illiliters of $BaCl_2$ Titrant Used: Titration; #1 ____ ml, #2 ____ ml, #3 ____

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

Normality of $BaCl_2$ Titrant equals: Titration; #1 ____, #2 ____, #3 ____
N = $BaCl_2$ Average Normality = .01023 N
Same as stk-5

Sulfur Dioxide Blank

Visual Observations: By:
Sample No.: 3094 Any Noted Sample Loss:
Volume of Hydrogen Peroxide Blank Titrated: Titration; #1 10 ml, #2 10 ml
Volume of $BaCl_2$ Titrant Used: Titration; #1 .02 ml, #2 .02 ml
Agreement of Replicate titrations (must be within 1% or 0.2 ml):
b = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: .02 ml

1.5

Sulfur Dioxide Sample

isual Observations: By:

ple No.: 3093 Any Noted Sample Loss:

tal Volume of SO_2 Sample (Vsoln) (should contain 100 ml.): 1000

olume of SO_2 Sample Aliquot Titrated (Va) (should be 20 ml): 10

olume of $BaCl_2$ Titrant Used: Titration; #1 17.58 ml., #2 17.60

reement of Replicate Titrations (must be within 1% or 0.2 ml):

verage Volume of $BaCl_2$ Titrant Used, (Vt): 17.59

K_2 = grams SO_2 per milliequivalent = 0.03203 g/meq

or

lbs. SO_2 per milliequivalent = 7.061×10^{-5} lb/meq

(std) = Volume of gas sampled (corrected to standard conditions from Method 6 Field
rm = 30.88 ds

Sulfur Dioxide Concentration (C_{SO_2}) equals:

$$C_{SO_2} = \overset{7.061\times10^{-5}}{K_2}\ \frac{\overset{.01023}{(N_{BaCl_2})}\overset{(17.59-.02)}{(V_t - V_{tb})}}{V_m(std)} \left(\frac{V_{soln}}{V_a}\right) \frac{1000}{10} = \text{EST.}$$

$$C_{SO_2} = \frac{}{30.88} = 4.1099 \times 10^{-5} \text{ lbs/ds}$$

Approved By: Gary H. Revlett Date: 8/20/90
Gary H. Revlett, Ph.D.
Analytical Chemist

KENVIRONS, INC.
EPA METHOD 6 LABORATORY
DATA SHEET FOR SO_2 CONCENTRATION

Client Bectell (LGE) Project No. 80019

Run No. STK-7 Analysis Date July 30 Analysis by

Barium Chloride Standardization

ormality of H_2SO_4 Standard: Titration; #1 ______ N, #2 ______ N, #3 ______

Milliliters of Standard H_2SO_4 Used: Titration; #1 ______ ml, #2 ______ ml, #3 ______

illiliters of $BaCl_2$ Titrant Used: Titration; #1 ______ ml, #2 ______ ml, #3 ______

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

ormality of $BaCl_2$ Titrant equals: Titration; #1 ______, #2 ______, #3 ______

N = $BaCl_2$ Average Normality = .01023 N

same as STK-5

Sulfur Dioxide Blank

isual Observations: By: ______

ample No.: 3112 Any Noted Sample Loss: ______

lume of Hydrogen Peroxide Blank Titrated: Titration; #1 10 ml, #2 10 m

olume of $BaCl_2$ Titrant Used: Titration; #1 .01 ml, #2 .01 m

greement of Replicate titrations (must be within 1% or 0.2 ml): ______

b = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: .01 m

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Sulfur Dioxide Sample

Visual Observations: By:

Sample No.: 3111 Any Noted Sample Loss:

Total Volume of SO_2 Sample (Vsoln) (should contain 100 ml.): 1000

Volume of SO_2 Sample Aliquot Titrated (Va) (should be 20 ml): 10

Volume of $BaCl_2$ Titrant Used: Titration; #1 8.69 ml., #2 8.70

Agreement of Replicate Titrations (must be within 1% or 0.2 ml):

Average Volume of $BaCl_2$ Titrant Used, (Vt): 8,695 GB

K_2 = grams SO_2 per milliequivalent = 0.03203 g/meq
or
lbs. SO_2 per milliequivalent = 7.061 x 10^{-5} lb/meq

Vm(std) = Volume of gas sampled (corrected to standard conditions from Method 6 Fiel Form = 27.66

Sulfur Dioxide Concentration (C_{SO_2}) equals:

$$C_{SO_2} = \overset{7.061\times10^{-5}}{K_2}\ \frac{\overset{.01023}{(N_{BaCl_2})}\overset{(8.695-.01)}{(V_t - V_{tb})}}{\underset{27.66}{V_m(std)}}\left(\frac{V_{soln}}{V_a}\right)^{\frac{1000}{10}} = 2.2680 \times 10^{-5}$$

EST

C_{SO_2} = ~~[illegible]~~ lb

Approved By: Gary H. Revlett Date: 8/28,
Gary H. Revlett, Ph.D.
Analytical Chemist

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KENVIRONS, INC.
EPA METHOD 6 LABORATORY

DATA SHEET FOR SO_2 CONCENTRATION

Client Bectell (LGE) Project No. 80019

Run No. STK-8 Analysis Date July 30 Analysis by Pal Rup

Barium Chloride Standardization

ormality of H_2SO_4 Standard: Titration; #1 ____ N, #2 ____ N, #3 ____

Milliliters of Standard H_2SO_4 Used: Titration; #1 ____ ml, #2 ____ ml, #3 ____

illiliters of $BaCl_2$ Titrant Used: Titration; #1 ____ ml, #2 ____ ml, #3 ____

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

Normality of $BaCl_2$ Titrant equals: Titration; #1 ____, #2 ____, #3 ____

$N = BaCl_2$ Average Normality = .01023 N

Same as STK-5

Sulfur Dioxide Blank

sual Observations: By:

Sample No.: 3127 Any Noted Sample Loss: ____

lume of Hydrogen Peroxide Blank Titrated: Titration; #1 10 ml, #2 10 m

Volume of $BaCl_2$ Titrant Used: Titration; #1 .02 ml, #2 .01 m

reement of Replicate titrations (must be within 1% or 0.2 ml): ____

b = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: .015 m

Sulfur Dioxide Sample

Visual Observations:

By:

! mple No.: 3/29

Any Noted Sample Loss:

1 tal Volume of SO_2 Sample (Vsoln) (should contain 100 ml.): 1000

Volume of SO_2 Sample Aliquot Titrated (Va) (should be 20 ml.): 10

olume of $BaCl_2$ Titrant Used: Titration; #1 8.74 ml., #2 8.76

: reement of Replicate Titrations (must be within 1% or 0.2 ml.):

Average Volume of $BaCl_2$ Titrant Used, (Vt): 8.75

K_2 = grams SO_2 per milliequivalent = 0.03203 g/meq
or
lbs. SO_2 per milliequivalent = 7.061×10^{-5} lb/meq

(std) = Volume of gas sampled (corrected to standard conditions from Method 6 Field = 24.28 ds

Sulfur Dioxide Concentration (C_{SO_2}) equals:

$$C_{SO_2} = \overset{7.061\times10^{-5}}{K_2}\ \frac{\overset{.01023}{(N_{BaCl_2})}\overset{(8.75-.015)}{(V_t - V_{tb})}}{V_m(std)} \left(\frac{V_{soln}}{V_a}\right)\frac{1000}{10} =$$

RST

$$C_{SO_2} = \qquad 24.28 \qquad = 2.1549 \times 10^{-5}$$ lbs/ds

Approved By: Date: 8/20/80
Gary W. Revlett, Ph.D.
Analytical Chemist

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KENVIRONS, INC.
EPA METHOD 6 LABORATORY
DATA SHEET FOR SO_2 CONCENTRATION

Client Bechtel (LGE) Project No. 80019

Run No. STK-9 Analysis Date July 30 Analysis by Pal Rap

Barium Chloride Standardization

ormality of H_2SO_4 Standard: Titration; #1 ______ N, #2 ______ N, #3 ______

Milliliters of Standard H_2SO_4 Used: Titration; #1 ______ ml., #2 ______ ml., #3 ______

illiliters of $BaCl_2$ Titrant Used: Titration; #1 ______ ml., #2 ______ ml., #3 ______

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

ormality of $BaCl_2$ Titrant equals: Titration; #1 ______, #2 ______, #3 ______

N = $BaCl_2$ Average Normality = .01023 N

Same as STK-5

Sulfur Dioxide Blank

isual Observations: By:

Sample No.: 3140 Any Noted Sample Loss: ______

olume of Hydrogen Peroxide Blank Titrated: Titration; #1 10 ml., #2 10 m

Volume of $BaCl_2$ Titrant Used: Titration; #1 .02 ml., #2 .03 m

greement of Replicate titrations (must be within 1% or 0.2 ml.): ______

tb = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: .025 m

Sulfur Dioxide Sample

isual Observations:

By:

mple No.: 3135 Any Noted Sample Loss:

tal Volume of SO_2 Sample (Vsoln) (should contain 100 ml.): 1000

olume of SO_2 Sample Aliquot Titrated (Va) (should be 20 ml.): 10

olume of $BaCl_2$ Titrant Used: Titration; #1 9.50 ml., #2 9.53

reement of Replicate Titrations (must be within 1% or 0.2 ml):

verage Volume of $BaCl_2$ Titrant Used, (Vt): 9515

K_2 = grams SO_2 per milliequivalent = 0.03203 g/meq

or

lbs. SO_2 per milliequivalent = 7.061×10^{-5} lb/meq

(std) = Volume of gas sampled (corrected to standard conditions from Method 6 Field

= 31.00 ds

Sulfur Dioxide Concentration (C_{SO_2}) equals:

$$C_{SO_2} = \overset{7.06\times10^{-5}}{K_2}\ \frac{\overset{.01023}{(N_{BaCl_2})}\overset{(9515-.025)}{(V_t - V_{tb})}\left(\frac{V_{soln}}{V_a}\right)^{\frac{1000}{10}}}{V_{m(std)}} =$$

RST

$$C_{SO_2} = \frac{\qquad}{31.00} = 2.2112 \times 10^{-5}$$ lbs/dsc

Approved By: Gary H. Revlett Date: 8/20/80

Gary H. Revlett, Ph.D.

Analytical Chemist

KENVIRONS, INC.
EPA METHOD 6 LABORATORY
DATA SHEET FOR SO_2 CONCENTRATION

Client Beckell (LGE) Project No. 80019

Run No. STK-10 Analysis Date July 30 Analysis by Pal Rup

Barium Chloride Standardization

ormality of H_2SO_4 Standard: Titration; #1 ____ N, #2 ____ N, #3 ____

Milliliters of Standard H_2SO_4 Used: Titration; #1 ____ ml., #2 ____ ml., #3 ____

illiliters of $BaCl_2$ Titrant Used: Titration; #1 ____ ml., #2 ____ ml., #3 ____

$$N = \text{Normality of } BaCl_2 = \frac{\text{Normality of } H_2SO_4 \times \text{ml. of } H_2SO_4}{\text{ml. of } BaCl_2}$$

ormality of $BaCl_2$ Titrant equals: Titration; #1 ____, #2 ____, #3 ____

N = $BaCl_2$ Average Normality = ,01023 N

Same as STK-5

Sulfur Dioxide Blank

isual Observations: By:

ample No.: 3153 Any Noted Sample Loss: ____

olume of Hydrogen Peroxide Blank Titrated: Titration; #1 10 ml., #2 10 m

olume of $BaCl_2$ Titrant Used: Titration; #1 ,06 ml., #2 .04 m

greement of Replicate titrations (must be within 1% or 0.2 ml.): ±03

tb = Volume of $BaCl_2$ Titrant Used for the Blank = Averaged $BaCl_2$ Volume: .05 m

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Sulfur Dioxide Sample

isual Observations:

By:

mple No.: 3155 Any Noted Sample Loss:

tal Volume of SO_2 Sample (Vsoln) (should contain 100 ml.): 1000

lume of SO_2 Sample Aliquot Titrated (Va) (should be 20 ml): 10

lume of $BaCl_2$ Titrant Used: Titration; #1 9.31 ml., #2 9.27

reement of Replicate Titrations (must be within 1% or 0.2 ml):

erage Volume of $BaCl_2$ Titrant Used, (Vt): 9.29

K_2 = grams SO_2 per milliequivalent = 0.03203 g/meq

or

lbs. SO_2 per milliequivalent = 7.061×10^{-5} lb/meq

std) = Volume of gas sampled (corrected to standard conditions from Method 6 Field

.m = 29.37 ds

Sulfur Dioxide Concentration (C_{SO_2}) equals:

$$C_{SO_2} = \overset{7.061 \times 10^{-5}}{K_2}\ \frac{\overset{.01023}{(N_{BaCl_2})}\overset{(9.29-.05)}{(V_t - V_{tb})}}{\underset{29.37}{V_{m(std)}}} \left(\frac{V_{soln}}{V_a}\right) \frac{1000}{10} =$$

RST

C_{SO_2} = = 2.2725×10^{-5} lbs/dsc

Approved By: Gary H. Revlett Date: 8/20/80

Gary H. Revlett, Ph.D.
Analytical Chemist

Appendix H. Preliminary Particulate Calculations
(Sequence: ESP-A-(1-10); ESP-B-(1-10); and STK-(1-10)
(Start on pp H-1; H-41; and H-80)

ESP-A-(1-10)

KENVIRONS, INC.

Calculations and Results

Facility	Bechtel LGE - CR6	**Date of run**	7-17-80
Project Number	80019	**Date of Calculation**	7-18-80
Run Number	BEC-ESP-A-1	**Calculated By**	RCT

Name	Description	Units	Value
V1	Initial Meter Reading	dcf	115.596
V2	Final Meter Reading	dcf	158.491
VM	Dry gas volume, Meter condition	dcf	42.525
PB	Barometer pressure @ (Lab.)	in. Hg.	29.66
PBC	Barometer pressure corrected @ (console)	in. Hg.	29.61
PM	Average orifice pressure drop (ΔH)	in. Hg.	0.58
Y	Dry gas meter calibration factor (curve)		1.024
TM	Average meter temperature	°F	104.77
(1) VMSTD	Dry gas volume, standard conditions	DSCF	40.41
VW	Total water collected	ml.	51.1
(2) PMOS	Percent moisture by volume	%	8.62
(3) MD	Mole fraction of dry gas	-	0.914
PCO2	Percent CO_2 by volume, dry	%	12.0
PO2	Percent O_2 by volume, dry	%	7.67
PCO	Percent CO by volume, dry	%	-0-
PN2	Percent N_2 by volume, dry	%	80.33
(4) MWD	Molecular weight, dry stack gas	-	30.23
(5) MW	Molecular weight, wet stack gas	-	29.17
DPS	Average stack gas velocity head (Avg.$\sqrt{\Delta P}$)	in. H_2O	0.51297
TS	Average stack temperature	°F	300.05
PS	Stack pressure, absolute	in. Hg.	23.46
(6) vs	Average stack gas velocity	fpm	2110
ID	Inside stack diameter	in.	—
AS	Stack area	sq. in.	33618
(7) QS	Stack flowrate, dry, standard conditions	DSCFM	298.000
TT	Net time of run	min.	100
DN	Nozzle diameter	in.	0.238
(8) PERI	Percent isokinetic	%	102.5
MF	Particulate weight, total	mg.	628.7
(9) CAN	Particulate loading, standard conditions	gr/DSCF	.2401
(10) CAT	Particulate loading, stack conditions	gr/ACF	.1450
(11) CAW	Particulate emission rate	lb/hr	613.
(12) C	Particulate concentration, standard conditions	lb/DSCF	.0000543
F	"F" factor	DSCF/MMBTU	9820
(13) E	Emission rate (lb per million BTU)	lb/MMBTU	.532

1. Volume of dry gas sampled at standard conditions (68°F, 29.921" Hg.), DSCF

$$VMSTD = \frac{17.636 \times VM \times Y \left[PBC + \frac{PM}{13.6}\right]}{(TM + 459.69)} = \frac{17.636 \times 42.59 \times 1.024 \left[29.61 + \frac{0.58}{13.6}\right]}{(104.77 + 459.69)} =$$

40.4100 DSCF
(.0001) Report (.01)

2. Volume of water vapor at standard conditions, SCF

$VWV = 0.04707 \times VW = 0.04707 \times 81.1 =$ 3.8174 SCF
(.0001) Report (.01)

Percent moisture in stack gas

$$PMOS = \frac{100 \times VWV}{VMSTD + VWV} = \frac{100 \times 3.8174}{40.4100 + 3.8174} =$$ 8.6313 %

5 Significant Digits Report
3 Significant Digits

3. Mole fraction of dry gas

$$MD = 1 - \left(\frac{VWV}{VMSTD + VWV}\right) = 1 - \left[\frac{3.8174}{40.4100 + 3.8174}\right] =$$ 0.91369
(.00001) Report (.001)

4. Molecular weight of dry stack gas

$MWD = (\%CO_2 \times 0.440) + (\%O_2 \times 0.320) + (\%CO + \%N_2) \times 0.280$

$= (12.0 \times 0.440) + (7.67 \times 0.320) + (80.33 \times 0.280) =$ 30.2268
(.0001) Report
(.0

5. Molecular weight of wet stack gas

$MW = MWD \times MD + 18.015 (1 - MD) = 30.2268 \times 0.91369 + 18.015 (1.00 - 0.91369) =$ 29.1725
(.0001) Report
(.0

6. Average stack gas velocity at stack conditons, fpm

$$s = 5129.4 \times Cp \times DPS \sqrt{\frac{TS + 459.69}{PS \times MW}}$$

$$= 5129.4 \times 0.84 \times 0.51297 \sqrt{\frac{300.05 + 459.69}{28.46 \times 29.1720}} = \underline{2114.3}\ \text{fpm}$$

(.1) Report (10)

7. Volumetric flowrate at standard conditions, DSCFM

$$S = \frac{0.12247 \times vs \times AS \times MD \times PS}{(TS + 459.69)}$$

$$= \frac{0.12247 \times 2114.3 \times 33615 \times 0.91369 \times 28.46}{(300.08 + 459.69)} = \underline{297933}\ \text{DSCF}$$

Five Significant Digits Report
3 Significant Digits

3. Percent isokinetic

$$ERI = \frac{1039.6 \times (TS + 459.69) \times VMSTD}{vs \times TT \times PS \times MD \times (DN)^2}$$

$$= \frac{1039.6 \times (300.05 + 459.69) \times 40.4100}{2114.3 \times 100 \times 28.46 \times 0.91369 \times (0.238)^2} = \underline{102.490}\ \%$$

(.001) Report (.1)

. Particulate loading at standard conditions, gr/DSCF

$$AN = 0.015432 \times (MF/VMSTD) = 0.015432 \times (628.7 / 40.4100) = \underline{.240092}\ \text{gr/DSCF}$$

5 Significant Digits Report
4 Significant Digits

10. Particulate loading at stack conditions, gr/ACF

$$AT = \frac{17.636 \times CAN \times PS \times MD}{(TS + 459.69)}$$

$$= \frac{17.636 \times .240092 \times 28.46 \times .914}{(300.08 + 459.69)} = \underline{.144970}\ \text{gr/ACF}$$

(.000001) Report (.0001)

1. Particulate emission rate, lbs/hr.

CAW = 0.008571 x CAN x QS

= 0.008571 x .240092 x 297933 = 613.10 lbs/hr.
5 Significant Digits Report
3 Significant Digits

2. Particulate loading at standard conditons, lb/DSCF

C = CAN ÷ 7,000 = .240092 ÷ 7,000 = .000034298 lb/DSCF
5 Significant Digits Report
3 Significant Digits

3. Particulate emission rate, lb/MMBTU

$$E = C \times F \times \frac{20.9}{20.9 - \%O_2}$$

F = DSCF/MMBTU, use 9820 for bituminous coal and O_2)

$$= .000034298 \times 9820 \times \frac{20.9}{20.9 - 7.67}$$

= .53207 lb/MMBTU
5 Significant Digits Report
3 Significant Digits

KENVIRONS, INC.

Calculations and Results

Facility Bechtel L.G.&E CR 6 Date of run 2-18-80

Project Number 80019 Date of Calculation 2-18-80

Run Number BEC-ESP-A-2 Calculated By HM

Name	Description	Units	Value
V1	Initial Meter Reading	dcf	166.670
V2	Final Meter Reading	dcf	210.754
VM	Dry gas volume, Meter condition	dcf	44.114
PB	Barometer pressure @ (Lab.)	in. Hg.	29.50
PBC	Barometer pressure corrected @ (console)	in. Hg.	29.75
PM	Average orifice pressure drop (ΔH)	in. Hg.	0.6402
Y	Dry gas meter calibration factor (curve)		1.025
TM	Average meter temperature	°F	104.15
(1) VMSTD	Dry gas volume, standard conditions	DSCF	42.1423
VW	Total water collected	ml.	91.6
(2) PMOS	Percent moisture by volume	%	9.28
(3) MD	Mole fraction of dry gas	-	0.907
PCO2	Percent CO_2 by volume, dry	%	12.0
PO2	Percent O_2 by volume, dry	%	7.5
PCO	Percent CO by volume, dry	%	-0-
PN2	Percent N_2 by volume, dry	%	80.5
(4) MWD	Molecular weight, dry stack gas	-	30.22
(5) MW	Molecular weight, wet stack gas	-	29.087
DPS	Average stack gas velocity head (Avg.$\sqrt{\Delta P}$)	in. H_2O	0.5480
TS	Average stack temperature	°F	311.68
PS	Stack pressure, absolute	in. Hg.	28.64
(6) vs	Average stack gas velocity	fpm	2270
ID	Inside stack diameter	in.	—
AS	Stack area	sq. in.	33615
(7) QS	Stack flowrate, dry, standard conditions	DSCFM	315,000
TT	Net time of run	min.	100
DN	Nozzle diameter	in.	0.238
(8) PERI	Percent isokinetic	%	101.066
MP	Particulate weight, total	mg.	822.1
(9) CAN	Particulate loading, standard conditions	gr/DSCF	.3010
(10) CAT	Particulate loading, stack conditions	gr/ACF	.1788
(11) CAW	Particulate emission rate	lb/hr	813
(12) C	Particulate concentration, standard conditions	lb/DSCF	.0000430
F	"F" factor	DSCF/MMBTU	9820
(13) E	Emission rate (lb per million BTU)	lb/MMBTU	.659

1. Volume of dry gas sampled at standard conditions (68°F, 29.921" Hg.), DSCF

$$VMSTD = \frac{17.636 \times VM \times Y \left[PBC + \frac{PM}{13.6}\right]}{(TM + 459.69)} = \frac{17.636 \times 41.114 \times 1.025 \left[[illegible].75 + \frac{0.64}{13.6}\right]}{(104.15 + 459.69)} =$$

42.1423 DSCF
(.0001) Report (.01)

2. Volume of water vapor at standard conditions, SCF

VWV = 0.04707 x VW = 0.04707 x 91.6 = 4.3116 SCF
(.0001) Report (.01)

Percent moisture in stack gas

$$PMOS = \frac{100 \times VWV}{VMSTD + VWV} = \frac{100 \times 4.3116}{42.1423 + 4.3116} = 9.2814\ \%$$

5 Significant Digits Report
3 Significant Digits

3. Mole fraction of dry gas

$$MD = 1 - \left(\frac{VWV}{VMSTD + VWV}\right) = 1 - \left[\frac{4.3116}{42.1423 + 4.3116}\right] = 0.90718$$

(.00001) Report (.001)

4. Molecular weight of dry stack gas

$MWD = (\%CO_2 \times 0.440) + (\%O_2 \times 0.320) + (\%CO + \%N_2) \times 0.280$

$= (12.0 \times 0.440) + (7.5 \times 0.320) + (80.5 \times 0.280) = 30.2200$
(.0001) Report (.01

5. Molecular weight of wet stack gas

$MW = MWD \times MD + 18.015\ (1 - MD) = 30.2200 \times 0.90718 + 18.015\ (1.00 - 0.90718) = 29.0571$
(.0001) Report (.01

6. Average stack gas velocity at stack conditons, fpm

$$vs = 5129.4 \times Cp \times DPS \sqrt{\frac{TS + 459.69}{PS \times MW}}$$

$$= 5129.4 \times 0.84 \times 0.5450 \sqrt{\frac{311.65 + 459.69}{28.64 \times 29.0571}} = \underline{\quad 2272.07 \quad}\ \text{fpm}$$

(.1) Report (10)

7. Volumetric flowrate at standard conditions, DSCFM

$$QS = \frac{0.12247 \times vs \times AS \times MD \times PS}{(TS + 459.69)}$$

$$= \frac{0.12247 \times 2272.07 \times 33615 \times 0.90719 \times 28.64}{(311.65 + 459.69)} = \underline{\quad 315054.5 \quad}\ \text{DSCFM}$$

Five Significant Digits Report
3 Significant Digits

8. Percent isokinetic

$$PERI = \frac{1039.6 \times (TS + 459.69) \times VMSTD}{vs \times TT \times PS \times MD \times (DN)^2}$$

$$= \frac{1039.6 \times (311.65 + 459.69) \times 42.1423}{2272.07 \times 100 \times 28.64 \times 0.90718 \times (0.238)^2} = \underline{\quad 101.066 \quad}\ \%$$

(.001) Report (.1)

9. Particulate loading at standard conditions, gr/DSCF

$$CAN = 0.015432 \times (MF/VMSTD) = 0.015432 \times (822.1 / 42.1423) = \underline{\quad .301043 \quad}\ \text{gr/DSCF}$$

6 Significant Digits Report
4 Significant Digits

10. Particulate loading at stack conditions, gr/ACF

$$CAT = \frac{17.636 \times CAN \times PS \times MD}{(TS + 459.69)}$$

$$= \frac{17.636 \times .301043 \times 28.64 \times .90718}{(311.68 + 459.69)} = \underline{\quad .178827 \quad}\ \text{gr/ACF}$$

(.000001) Report (.0001)

11. Particulate emission rate, lbs/hr.

CAW = 0.008571 x CAN x QS

= 0.008571 x .301043 x 315084 = 812.99 lbs/hr.
5 Significant Digits Report
3 Significant Digits

12. Particulate loading at standard conditons, lb/DSCF

C = CAN ÷ 7,000 = .301043 ÷ 7,000 = .000043006 lb/DSCF
5 Significant Digits Report
3 Significant Digits

13. Particulate emission rate, lb/MMBTU

$$E = C \times F \times \frac{20.9}{20.9 - \%O_2}$$

(F = DSCF/MMBTU, use 9820 for bituminous coal and O_2)

$$E = .000043006 \times 9820 \times \frac{20.9}{20.9 - 7.5}$$

E = .65869 lb/MMBTU
5 Significant Digits Report
3 Significant Digits

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KENVIRONS, INC.

Bechtel Calculations and Results

Facility LGE - CR6

Date of run 7-19-80

Project Number 80019

Date of Calculation 7-19-80

Run Number BEC-ESP-A-3

Calculated By

Name	Description	Units	Value
V1	Initial Meter Reading	dcf	223.300
V2	Final Meter Reading	dcf	268.890
VM	Dry gas volume, Meter condition	dcf	45.59
PB	Barometer pressure @ (Lab.)	in. Hg.	29.56
PBC	Barometer pressure corrected @ (console)	in. Hg.	29.81
PM	Average orifice pressure drop (ΔH)	in. Hg.	0.6518
Y	Dry gas meter calibration factor (curve)		1.025
TM	Average meter temperature	°F	107.06
(1) VMSTD	Dry gas volume, standard conditions	DSCF	43.42
VW	Total water collected	ml.	97.9
(2) PMOS	Percent moisture by volume	%	9.60
(3) MD	Mole fraction of dry gas	-	0.90405
PCO2	Percent CO_2 by volume, dry	%	11.50
PO2	Percent O_2 by volume, dry	%	7.75
PCO	Percent CO by volume, dry	%	-0-
PN2	Percent N_2 by volume, dry	%	80.75
(4) MWD	Molecular weight, dry stack gas	-	30.15
(5) MW	Molecular weight, wet stack gas	-	28.99
DPS	Average stack gas velocity head (Avg. $\sqrt{\Delta P}$)	in. H_2O	0.55748
TS	Average stack temperature	°F	309.68
PS	Stack pressure, absolute	in. Hg.	28.69
(6) vs	Average stack gas velocity	fpm	2310
ID	Inside stack diameter	in.	—
AS	Stack area	sq. in.	33618
(7) QS	Stack flowrate, dry, standard conditions	DSCFM	321,000
TT	Net time of run	min.	100
DN	Nozzle diameter	in.	0.238
(8) PERI	Percent isokinetic	%	102.3
MF	Particulate weight, total	mg.	1194.7
(9) CAN	Particulate loading, standard conditions	gr/DSCF	.4246
(10) CAT	Particulate loading, stack conditions	gr/ACF	.2525
(11) CAW	Particulate emission rate	lb/hr	1170.
(12) C	Particulate concentration, standard conditions	lb/DSCF	.0000607
F	"F" factor	DSCF/MMBTU	9820
(13) E	Emission rate (lb per million BTU)	lb/MMBTU	.947

1. Volume of dry gas sampled at standard conditions (68°F, 29.921" Hg.), DSCF 143

$$\text{VMSTD} = \frac{17.636 \times \text{VM} \times \text{Y}\left[\text{PBC} + \frac{\text{PM}}{13.6}\right]}{(\text{TM} + 459.69)} = \frac{17.636 \times 45.59 \times 1.025\left[29.51 + \frac{0.6519}{13.6}\right]}{(107.06 + 459.69)} =$$

43.4172 DSCF
(.0001) Report (.01)

2. Volume of water vapor at standard conditions, SCF

$\text{VWV} = 0.04707 \times \text{VW} = 0.04707 \times 97.9 =$ 4.60815 SCF
(.0001) Report (.01)

Percent moisture in stack gas

$$\text{PMOS} = \frac{100 \times \text{VWV}}{\text{VMSTD} + \text{VWV}} = \frac{100 \times 4.60815}{43.4172 + 4.60815} =$$

9.5952 %
5 Significant Digits Report
3 Significant Digits

3. Mole fraction of dry gas

$$\text{MD} = 1 - \left(\frac{\text{VWV}}{\text{VMSTD} + \text{VWV}}\right) = 1 - \left[\frac{4.60815}{43.4172 + 4.60815}\right] =$$

0.90405
(.00001) Report (.001)

4. Molecular weight of dry stack gas

$\text{MWD} = (\%CO_2 \times 0.440) + (\%O_2 \times 0.320) + (\%CO + \%N_2) \times 0.280$

$= (11.5 \times 0.440) + (7.75 \times 0.320) + (80.75 \times 0.280) =$ 30.1500
(.0001) Report
(.0

5. Molecular weight of wet stack gas

$\text{MW} = \text{MWD} \times \text{MD} + 18.015\,(1 - \text{MD}) = 30.15 \times 0.90405 + 18.015\,(1.00 - 0.90405) =$ 28.9856
(.0001) Report
(.0

14

6. Average stack gas velocity at stack conditons, fpm

$$vs = 5129.4 \times Cp \times DPS \sqrt{\frac{TS + 459.69}{PS \times MW}}$$

$$= 5129.4 \times 0.84 \times 0.55748 \sqrt{\frac{309.68 + 459.69}{28.69 \times 28.9856}} = \underset{\text{(.1) Report (10)}}{\underline{2310.39}} \text{ fp}$$

7. Volumetric flowrate at standard conditions, DSCFM

$$QS = \frac{0.12247 \times vs \times AS \times MD \times PS}{(TS + 459.69)}$$

$$= \frac{0.12247 \times 2310.39 \times 33618 \times 0.90405 \times 28.69}{(309.68 + 459.69)} = \underline{320682} \text{ DSC}$$

Five Significant Digits Report
3 Significant Digits

8. Percent isokinetic

$$PERI = \frac{1039.6 \times (TS + 459.69) \times VMSTD}{vs \times TT \times PS \times MD \times (DN)^2}$$

$$= \frac{1039.6 \times (309.68 + 459.69) \times 43.4172}{2310.39 \times 100 \times 28.69 \times 0.90405 \times (0.238)^2} = \underset{\text{(:001) Report (.1)}}{\underline{102.306}}$$

9. Particulate loading at standard conditions, gr/DSCF

$$CAN = 0.015432 \times (MF/VMSTD) = 0.015432 \times (1194.7 / 43.4172) = \underline{.424638} \text{ gr/DSCF}$$

5 Significant Digits Report
4 Significant Digits

10. Particulate loading at stack conditions, gr/ACF

$$CAT = \frac{17.636 \times CAN \times PS \times MD}{(TS + 459.69)}$$

$$= \frac{17.636 \times .424638 \times 28.69 \times .90405}{(309.68 + 459.69)} = \underset{\text{(.000001) Report (.0001)}}{\underline{.252468}} \text{ gr/ACF}$$

145

11. Particulate emission rate, lbs/hr.

CAW = 0.008571 x CAN x QS

= 0.008571 x .424638 x 320682 = 1167.1 ______ lbs/hr.
5 Significant Digits Report
3 Significant Digits

12. Particulate loading at standard conditons, lb/DSCF

C = CAN ÷ 7,000 = .424638 ÷ 7,000 = .000060662 lb/DSCF
5 Significant Digits Report
3 Significant Digits

13. Particulate emission rate, lb/MMBTU

$$E = C \times F \times \frac{20.9}{20.9 - \%O_2}$$

(F = DSCF/MMBTU, use 9820 for bituminous coal and O_2)

$$E = .000060662 \times 9820 \times \frac{20.9}{20.9 - 7.75}$$

E = .94678 lb/MMBTU
5 Significant Digits Report
3 Significant Digits

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KENVIRONS, INC.

Calculations and Results

Bechtel
Facility LGE - CR6
Date of run 7-20-80
Project Number 80019
Date of Calculation 7-20-80
Run Number BEC-ESP-A-4
Calculated By RCT

Name	Description	Units	Value
V1	Initial Meter Reading	dcf	276.557
V2	Final Meter Reading	dcf	321.317
VM	Dry gas volume, Meter condition	dcf	44.76
PB	Barometer pressure @ (Lab.)	in. Hg.	29.85
PBC	Barometer pressure corrected @ (console)	in. Hg.	29.80
PM	Average orifice pressure drop (ΔH)	in. Hg.	0.6206
Y	Dry gas meter calibration factor (curve)		1.0245
TM	Average meter temperature	°F	118.25
(1) VMSTD	Dry gas volume, standard conditions	DSCF	41.76
VW	Total water collected	ml.	96.0
(2) PMOS	Percent moisture by volume	%	9.76
(3) MD	Mole fraction of dry gas	-	0.902
PCO2	Percent CO_2 by volume, dry	%	12.75
PO2	Percent O_2 by volume, dry	%	8.5
PCO	Percent CO by volume, dry	%	-0-
PN2	Percent N_2 by volume, dry	%	78.75
(4) MWD	Molecular weight, dry stack gas	-	30.38
(5) MW	Molecular weight, wet stack gas	-	29.17
DPS	Average stack gas velocity head (Avg.$\sqrt{\Delta P}$)	in. H_2O	0.540647
TS	Average stack temperature	°F	301.24
PS	Stack pressure, absolute	in. Hg.	29.75
(6) vs	Average stack gas velocity	fpm	2220
ID	Inside stack diameter	in.	-
AS	Stack area	sq. in.	33618
(7) QS	Stack flowrate, dry, standard conditions	DSCFM	311,000
TT	Net time of run	min.	100
DN	Nozzle diameter	in.	0.238
(8) PERI	Percent isokinetic	%	101.3
MF	Particulate weight, total	mg.	1080.9
(9) CAN	Particulate loading, standard conditions	gr/DSCF	.3994
(10) CAT	Particulate loading, stack conditions	gr/ACF	.2402
(11) CAW	Particulate emission rate	lb/hr	1070
(12) C	Particulate concentration, standard conditions	lb/DSCF	.0000571
F	"F" factor	DSCF/MMBTU	9820
(13) E	Emission rate (lb per million BTU)	lb/MMBTU	.944

1. Volume of dry gas sampled at standard conditions (68°F, 29.921" Hg.), DSCF

$$\text{VMSTD} = \frac{17.636 \times \text{VM} \times \text{Y}\left[\text{PBC} + \frac{\text{PM}}{13.6}\right]}{(\text{TM} + 459.69)} = \frac{17.636 \times 44.76 \times 1.0245\left[29.90 + \frac{0.62}{13.6}\right]}{(118.25 + 459.69)} =$$

147

41.7637 DSCF
(.0001) Report (.01)

2. Volume of water vapor at standard conditions, SCF

$\text{VWV} = 0.04707 \times \text{VW} = 0.04707 \times 96.0$ = 4.5187 SCF
(.0001) Report (.01)

Percent moisture in stack gas

$$\text{PMOS} = \frac{100 \times \text{VWV}}{\text{VMSTD} + \text{VWV}} = \frac{100 \times 4.5187}{41.7637 + 4.5187} =$$

9.7633 %
5 Significant Digits Report
3 Significant Digits

3. Mole fraction of dry gas

$$\text{MD} = 1 - \left(\frac{\text{VWV}}{\text{VMSTD} + \text{VWV}}\right) = 1 - \left[\frac{4.5187}{41.7637 + 4.5187}\right] =$$

0.90237
(.00001) Report (.001)

4. Molecular weight of dry stack gas

$\text{MWD} = (\%CO_2 \times 0.440) + (\%O_2 \times 0.320) + (\%CO + \%N_2) \times 0.280$

$= (12.75 \times 0.440) + (8.5 \times 0.320) + (78.75 \times 0.280) =$ 30.3800
(.0001) Report
(.01

5. Molecular weight of wet stack gas

$\text{MW} = \text{MWD} \times \text{MD} + 18.015\,(1 - \text{MD}) = 30.38 \times 0.90237 + 18.015\,(1.00 - 0.90237) =$ 29.1728
(.0001) Report
(.01

6. Average stack gas velocity at stack conditons, fpm

$$vs = 5129.4 \times Cp \times DPS \sqrt{\frac{TS + 459.69}{PS \times MW}}$$

$$= 5129.4 \times 0.84 \times 0.540647 \sqrt{\frac{301.24 + 459.69}{28.75 \times 29.1728}} = \underset{\text{(.1) Report (10)}}{\underline{2218.83}} \text{ fpm}$$

7. Volumetric flowrate at standard conditions, DSCFM

$$QS = \frac{0.12247 \times vs \times AS \times MD \times PS}{(TS + 459.69)}$$

$$= \frac{0.12247 \times 2218.83 \times 33618 \times 0.90237 \times 28.75}{(301.24 + 459.69)} = \underset{\text{Five Significant Digits Report 3 Significant Digits}}{\underline{311{,}460.81}} \text{ DSCF}$$

8. Percent isokinetic

$$PERI = \frac{1039.6 \times (TS + 459.69) \times VMSTD}{vs \times TT \times PS \times MD \times (DN)^2}$$

$$= \frac{1039.6 \times (301.24 + 459.69) \times 41.7637}{2218.83 \times 100 \times 28.75 \times 0.90237 \times (0.238)^2} = \underset{\text{(.001) Report (.1)}}{\underline{101.323}} ;$$

9. Particulate loading at standard conditions, gr/DSCF

$$CAN = 0.015432 \times (^{MF}/VMSTD) = 0.015432 \times (1080.9 / 41.7637) = \underset{\text{6 Significant Digits Report 4 Significant Digits}}{\underline{.399401}} \text{ gr/DSCF}$$

10. Particulate loading at stack conditions, gr/ACF

$$CAT = \frac{17.636 \times CAN \times PS \times MD}{(TS + 459.69)}$$

$$= \frac{17.636 \times .399401 \times 28.75 \times .90237}{(301.24 + 459.69)} = \underset{\text{(.000001) Report (.0001)}}{\underline{.240152}} \text{ gr/ACF}$$

11. Particulate emission rate, lbs/hr.

CAW = 0.008571 x CAN x QS

= 0.008571 x .399401 x 311460.81 = 1066.2 lbs/hr.
5 Significant Digits Report
3 Significant Digits

12. Particulate loading at standard conditons, lb/DSCF

C = CAN ÷ 7,000 = .399401 ÷ 7,000 = .000057057 lb/DSCF
5 Significant Digits Report
3 Significant Digits

13. Particulate emission rate, lb/MMBTU

$$E = C \times F \times \frac{20.9}{20.9 - \%O_2}$$

(F = DSCF/MMBTU, use 9820 for bituminous coal and O_2)

$$E = .000057057 \times 9820 \times \frac{20.9}{20.9 - 8.5}$$

E = .9438 lb/MMBTU
5 Significant Digits Report
3 Significant Digits

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KENVIRONS, INC.

[illegible]
BEC-ESP-A-5 Calculations and Results

Facility LG&E Cane Run 6
Date of run 7/21/80
Project Number 80019
Date of Calculation 7/24/80
Run Number BEC-ESP-A-5
Calculated By MM & PR

Name	Description	Units	Value
V1	Initial Meter Reading	dcf	327.841
V2	Final Meter Reading	dcf	373.796
VM	Dry gas volume, Meter condition	dcf	45.955
PB	Barometer pressure @ (Lab.)	in. Hg.	~~29.81~~ 29.89
PBC	Barometer pressure corrected @ (console)	in. Hg.	29.83
PM	Average orifice pressure drop (ΔH)	in. Hg.	0.6452
Y	Dry gas meter calibration factor (curve)		1.025
TM	Average meter temperature	°F	110.88
(1) VMSTD	Dry gas volume, standard conditions	DSCF	43.5005
VW	Total water collected	ml.	102.5
(2) PMOS	Percent moisture by volume	%	9.9751
(3) MD	Mole fraction of dry gas	–	.90024
PCO2	Percent CO_2 by volume, dry	%	12.75
PO2	Percent O_2 by volume, dry	%	7.75
PCO	Percent CO by volume, dry	%	0
PN2	Percent N_2 by volume, dry	%	79.50
(4) MWD	Molecular weight, dry stack gas	–	30.3500
(5) MW	Molecular weight, wet stack gas	–	29.1195
DPS	Average stack gas velocity head (Avg.$\sqrt{\Delta P}$)	in. H_2O	0.57679
TS	Average stack temperature	°F	308.88
PS	Stack pressure, absolute	in. Hg.	28.73
(6) vs	Average stack gas velocity	fpm	2382.0
ID	Inside stack diameter	in.	—
AS	Stack area	sq. in.	33618
(7) QS	Stack flowrate, dry, standard conditions	DSCFM	330030
TT	Net time of run	min.	100
DN	Nozzle diameter	in.	.238
(8) PERI	Percent isokinetic	%	99.600
MF	Particulate weight, total	mg.	1397.1
(9) CAN	Particulate loading, standard conditions	gr/DSCF	.4956
(10) CAT	Particulate loading, stack conditions	gr/ACF	.3941
(11) CAW	Particulate emission rate	lb/hr	1400
(12) C	Particulate concentration, standard conditions	lb/DSCF	.000070804
F	"F" factor	DSCF/MMBTU	9820
(13) E	Emission rate (lb per million BTU)	lb/MMBTU	1.11

1. **Volume of dry gas sampled at standard conditions (68°F, 29.921" Hg.), DSCF**

$$VMSTD = \frac{17.636 \times VM \times Y \left[PBC + \frac{PM}{13.6}\right]}{(TM + 459.69)} = \frac{17.636 \times 45.955 \times 1.025 \left[29.85 + \frac{.6482}{13.6}\right]}{(110.88 + 459.69)} =$$

570.57

43.5005 DSCF
(.0001) Report (.01)

2. **Volume of water vapor at standard conditions, SCF**

$$VWV = 0.04707 \times VW = 0.04707 \times 102.5 = 4.82$$

(.0001) Report (.01) SCF

Percent moisture in stack gas

$$PMOS = \frac{100 \times VWV}{VMSTD + VWV} = \frac{100 \times 4.82}{43.5005 + 4.82} = 9.9751 \%$$

5 Significant Digits Report
3 Significant Digits

3. **Mole fraction of dry gas**

$$MD = 1 - \left(\frac{VWV}{VMSTD + VWV}\right) = 1 - \left[\frac{4.82}{43.5005 + 4.82}\right] = .90024$$

(.00001) Report (.001)

4. **Molecular weight of dry stack gas**

$$MWD = (\%CO_2 \times 0.440) + (\%O_2 \times 0.320) + (\%CO + \%N_2) \times 0.280$$

$$= (12.75 \times 0.440) + (7.75_{2.48} \times 0.320) + (79.50_{22.26} \times 0.280) = 30.3500$$

(.0001) Report
(.0

5. **Molecular weight of wet stack gas**

$$MW = MWD \times MD + 18.015 (1 - MD) = 30.35 \times .90024 + 18.015 (1.00 - .90024) = 29.1195$$

1.7972 .09976

(.0001) Report
(.C

6. Average stack gas velocity at stack conditons, fpm

$$vs = 5129.4 \times Cp \times DPS \sqrt{\frac{TS + 459.69}{PS \times MW}}$$

$$= 5129.4 \times .84 \times .57679 \sqrt{\frac{308.88 + 459.69}{28.73 \times 29.1195}} = 2382.0 \text{ fp}$$

(.1) Report (10)

7. Volumetric flowrate at standard conditions, DSCFM

$$QS = \frac{0.12247 \times vs \times AS \times MD \times PS}{(TS + 459.69)}$$

$$= \frac{0.12247 \times 2382.0 \times 33618 \times .90024 \times 28.73}{(308.88 + 459.69)} = 330030. \text{ DSC}$$

768.57

Five Significant Digits Report
3 Significant Digits

8. Percent isokinetic

$$PERI = \frac{1039.6 \times (TS + 459.69) \times VMSTD}{vs \times TT \times PS \times MD \times (DN)^2}$$

$$= \frac{1039.6 \times (308.88 + 459.69) \times 43.5005}{2382.0 \times 100 \times 28.73 \times .90024 \times (.238)^2} = 99.600$$

(:001) Report (.1)

9. Particulate loading at standard conditions, gr/DSCF

$$CAN = 0.015432 \times (^{MF}/VMSTD) = 0.015432 \times (1397.1 / 43.5005) = .495628 \text{ gr/DSCF}$$

6 Significant Digits Report
4 Significant Digits

10. Particulate loading at stack conditions, gr/ACF

$$CAT = \frac{17.636 \times CAN \times PS \times MD}{(TS + 459.69)}$$

$$= \frac{17.636 \times .495628 \times 28.73 \times .90024}{(308.88 + 459.69)} = .294148 \text{ gr/ACF}$$

(.000001) Report (.0001)

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11. Particulate emission rate, lbs/hr.

CAW = 0.008571 x CAN x QS

= 0.008571 x .495628 x 330030 = 1401.0 lbs/hr.
5 Significant Digits Report
3 Significant Digits

12. Particulate loading at standard conditons, lb/DSCF

C = CAN ÷ 7,000 = .495628 ÷ 7,000 = .000070804 lb/DSCF
5 Significant Digits Report
3 Significant Digits

13. Particulate emission rate, lb/MMBTU

$$E = C \times F \times \frac{20.9}{20.9 - \%O_2}$$

(F = DSCF/MMBTU, use 9820 for bituminous coal and O_2)

$$E = .000070804 \times 9820 \times \frac{20.9}{20.9 - 7.75}$$

E = 1.1051 lb/MMBTU
5 Significant Digits Report
3 Significant Digits

KENVIRONS, INC.

Bechtel Calculations and Results

Facility LGE – CR6 Date of run 7-22-80

Project Number 80019 Date of Calculation 7-22-80

Run Number BEC-ESP-A-6 Calculated By pm & RCT

Name	Description	Units	Value
V1	Initial Meter Reading	dcf	380.300
V2	Final Meter Reading	dcf	424.543
VM	Dry gas volume, Meter condition	dcf	44.243
PB	Barometer pressure @ (Lab.)	in. Hg.	29.79
PBC	Barometer pressure corrected @ (console)	in. Hg.	29.74
PM	Average orifice pressure drop (ΔH)	in. Hg.	0.6072
Y	Dry gas meter calibration factor (curve)		1.0245
TM	Average meter temperature	°F	85.43
(1) VMSTD	Dry gas volume, standard conditions	DSCF	43.36
VW	Total water collected	ml.	108.6
(2) PMOS	Percent moisture by volume	%	10.54
(3) MD	Mole fraction of dry gas	-	0.894
PCO2	Percent CO_2 by volume, dry	%	11.125
PO2	Percent O_2 by volume, dry	%	8.125
PCO	Percent CO by volume, dry	%	-0-
PN2	Percent N_2 by volume, dry	%	80.75
(4) MWD	Molecular weight, dry stack gas	-	30.105
(5) MW	Molecular weight, wet stack gas	-	28.53
DPS	Average stack gas velocity head (Avg.$\sqrt{\Delta P}$)	in. H_2O	0.5462084
TS	Average stack temperature	°F	297.96
PS	Stack pressure, absolute	in. Hg.	28.67
(6) vs	Average stack gas velocity	fpm	2250
ID	Inside stack diameter	in.	-
AS	Stack area	sq. in.	33618
(7) QS	Stack flowrate, dry, standard conditions	DSCFM	314,000
TT	Net time of run	min.	100
DN	Nozzle diameter	in.	0.238
(8) PERI	Percent isokinetic	%	104.34
MF	Particulate weight, total	mg.	1212.2
(9) CAN	Particulate loading, standard conditions	gr/DSCF	.4314
(10) CAT	Particulate loading, stack conditions	gr/ACF	.2576
(11) CAW	Particulate emission rate	lb/hr	1160.
(12) C	Particulate concentration, standard conditions	lb/DSCF	.0000616
F	"F" factor	DSCF/MMBTU	9820
(13) E	Emission rate (lb per million BTU)	lb/MMBTU	.990

1. Volume of dry gas sampled at standard conditions (68°F, 29.921" Hg.), DSCF

$$VMSTD = \frac{17.636 \times VM \times Y \left[PBC + \frac{PM}{13.6}\right]}{(TM + 459.69)} = \frac{17.636 \times 44.243 \times 1.0245 \left[29.74 + \frac{0.607}{13.6}\right]}{(89.43 + 459.69)} =$$

43.3592 DSCF
(.0001) Report (.01)

2. Volume of water vapor at standard conditions, SCF

$$VWV = 0.04707 \times VW = 0.04707 \times 105.6 = 5.1118 \text{ SCF}$$

(.0001) Report (.01)

Percent moisture in stack gas

$$PMOS = \frac{100 \times VWV}{VMSTD + VWV} = 100 \times \frac{5.1118}{43.3598 + 5.1118} = 10.54 \%$$

5 Significant Digits Report
3 Significant Digits

3. Mole fraction of dry gas

$$MD = 1 - \left(\frac{VWV}{VMSTD + VWV}\right) = 1 - \left[\frac{5.1118}{43.3592 + 5.1118}\right] = 0.89454$$

(.00001) Report (.001)

4. Molecular weight of dry stack gas

$$MWD = (\%CO_2 \times 0.440) + (\%O_2 \times 0.320) + (\%CO + \%N_2) \times 0.280$$

$$= (11.125 \times 0.440) + (8.125 \times 0.320) + (80.75 \times 0.280) = 30.105$$

(.0001) Report
(.0

5. Molecular weight of wet stack gas

$$MW = MWD \times MD + 18.015\,(1 - MD) = 30.105 \times 0.89454 + 18.015\,(1.00 - 0.89454) = 28.8300$$

(.0001) Report
(.0

1k

6. Average stack gas velocity at stack conditons, fpm

$$\text{vs} = 5129.4 \times \text{Cp} \times \text{DPS} \sqrt{\frac{\text{TS} + 459.69}{\text{PS} \times \text{MW}}}$$

$$= 5129.4 \times 0.94 \times 0.5462 \sqrt{\frac{297.96 + 459.69}{29.67 \times 25.53}} = \underset{(.1)\ \text{Report}\ (10)}{\underline{2253.19}}\ \text{fpm}$$

7. Volumetric flowrate at standard conditions, DSCFM

$$\text{QS} = \frac{0.12247 \times \text{vs} \times \text{AS} \times \text{MD} \times \text{PS}}{(\text{TS} + 459.69)}$$

$$= \frac{0.12247 \times 2253.19 \times 33618 \times 0.89454 \times 28.67}{(297.96 + 459.69)} = \underline{314{,}019.27}\ \text{DSCF}$$

Five Significant Digits Report
3 Significant Digits

8. Percent isokinetic

$$\text{PERI} = \frac{1039.6 \times (\text{TS} + 459.69) \times \text{VMSTD}}{\text{vs} \times \text{TT} \times \text{PS} \times \text{MD} \times (\text{DN})^2}$$

$$= \frac{1039.6 \times (297.96 + 459.69) \times 43.3592}{2253.19 \times 100 \times 29.67 \times 0.99454 \times (.238)^2} = \underset{(.001)\ \text{Report}\ (.1)}{\underline{104.34}}$$

9. Particulate loading at standard conditions, gr/DSCF

$$\text{CAN} = 0.015432 \times (\text{MF}/\text{VMSTD}) = 0.015432 \times (1212.2\ /143.3592) = \underline{.431435}\ \text{gr/DSCF}$$

5 Significant Digits Report
4 Significant Digits

10. Particulate loading at stack conditions, gr/ACF

$$\text{CAT} = \frac{17.636 \times \text{CAN} \times \text{PS} \times \text{MD}}{(\text{TS} + 459.69)}$$

$$= \frac{17.636 \times .431435 \times 28.67 \times .89454}{(297.96 + 459.69)} = \underset{(.000001)\ \text{Report}\ (.0001)}{\underline{.257557}}\ \text{gr/ACF}$$

11. Particulate emission rate, lbs/hr.

CAW = 0.008571 x CAN x QS

= 0.008571 x .431435 x 314019.27 = 1161.2 lbs/hr.
5 Significant Digits Report
3 Significant Digits

12. Particulate loading at standard conditons, lb/DSCF

C = CAN ÷ 7,000 = .431435 ÷ 7,000 = .000061633 lb/DSCF
5 Significant Digits Report
3 Significant Digits

13. Particulate emission rate, lb/MMBTU

$$E = C \times F \times \frac{20.9}{20.9 - \%O_2}$$

(F = DSCF/MMBTU, use 9820 for bituminous coal and O_2)

$$E = .000061633 \times 9820 \times \frac{20.9}{20.9 - 8.125}$$

E = .99017 lb/MMBTU
5 Significant Digits Report
3 Significant Digits

KENVIRONS, INC.

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Bechtel Calculations and Results

Facility	LGE-CR6	Date of run	7-23-80
Project Number	90019	Date of Calculation	7-23-80
Run Number	BEC-ESP-A-7	Calculated By	JG

Name	Description	Units	Value
V1	Initial Meter Reading	dcf	430.959 ✓
V2	Final Meter Reading	dcf	472.825 ✓
VM	Dry gas volume, Meter condition	dcf	41.866 ✓
PB	Barometer pressure @ (Lab.)	in. Hg.	29.80
PBC	Barometer pressure corrected @ (console)	in. Hg.	29.75
PM	Average orifice pressure drop (ΔH)	in. Hg.	0.5354
Y	Dry gas meter calibration factor (curve)		1.023
TM	Average meter temperature	°F	94.74
(1) VMSTD	Dry gas volume, standard conditions	DSCF	40.58
VW	Total water collected	ml.	90.0
(2) PMOS	Percent moisture by volume	%	9.45
(3) MD	Mole fraction of dry gas	–	0.905
PCO2	Percent CO_2 by volume, dry	%	10.7
PO2	Percent O_2 by volume, dry	%	7.3
PCO	Percent CO by volume, dry	%	82.0
PN2	Percent N_2 by volume, dry	%	
(4) MWD	Molecular weight, dry stack gas	–	30.00
(5) MW	Molecular weight, wet stack gas	–	28.87
DPS	Average stack gas velocity head (Avg.$\sqrt{\Delta P}$)	in. H_2O	0.51677
TS	Average stack temperature	°F	304.48
PS	Stack pressure, absolute	in. Hg.	28.80
(6) vs	Average stack gas velocity	fpm	2130
ID	Inside stack diameter	in.	78 x 431
AS	Stack area	sq. in.	33618
(7) QS	Stack flowrate, dry, standard conditions	DSCFM	300000
TT	Net time of run	min.	100
DN	Nozzle diameter	in.	0.238
(8) PERI	Percent isokinetic	%	102.3
MF	Particulate weight, total	mg.	718.5
(9) CAN	Particulate loading, standard conditions	gr/DSCF	.2782
(10) CAT	Particulate loading, stack conditions	gr/ACF	.1644
(11) CAW	Particulate emission rate	lb/hr	702.
(12) C	Particulate concentration, standard conditions	lb/DSCF	.00003903
F	"F" factor	DSCF/MMBTU	9820
(13) E	Emission rate (lb per million BTU)	lb/MMBTU	.589

1. Volume of dry gas sampled at standard conditions (68°F, 29.921" Hg.), DSCF

$$VMSTD = \frac{17.636 \times VM \times Y \left[PBC + \frac{PM}{13.6}\right]}{(TM + 459.69)} = \frac{17.636 \times 41.866 \times 1.023 \left[29.75 + \frac{0.5554}{13.6}\right]}{(94.74 + 459.69)} =$$

40.5837 DSCF
(.0001) Report (.01)

2. Volume of water vapor at standard conditions, SCF

$VWV = 0.04707 \times VW = 0.04707 \times 90.0 =$ 4.2363 SCF
(.0001) Report (.01)

Percent moisture in stack gas

$$PMOS = \frac{100 \times VWV}{VMSTD + VWV} = \frac{100 \times 4.2363}{40.5837 + 4.2363} = 9.4518\ \%$$

5 Significant Digits Report
3 Significant Digits

3. Mole fraction of dry gas

$$MD = 1 - \left(\frac{VWV}{VMSTD + VWV}\right) = 1 - \left[\frac{4.2363}{40.5837 + 4.2363}\right] = 0.90548$$

(.00001) Report (.001)

4. Molecular weight of dry stack gas

$MWD = (\%CO_2 \times 0.440) + (\%O_2 \times 0.320) + (\%CO + \%N_2) \times 0.280$

$= (10.7 \times 0.440) + (7.3 \times 0.320) + (82.0 \times 0.280) =$ 30.0040
(.0001) Report
(.0

5. Molecular weight of wet stack gas

$MW = MWD \times MD + 18.015\ (1 - MD) = 30.0040 \times 0.90548 + 18.015\ (1.00 - 0.90548) =$ 28.870
(.0001) Report
(.0

6. Average stack gas velocity at stack conditons, fpm

18

$$vs = 5129.4 \times Cp \times DPS \sqrt{\frac{TS + 459.69}{PS \times MW}}$$

$$= 5129.4 \times 0.84 \times 0.51677 \sqrt{\frac{304.48 + 459.69}{28.80 \times 28.8708}} = \underset{\text{(.1) Report (10)}}{\underline{2134.6}}\ \text{fp}$$

7. Volumetric flowrate at standard conditions, DSCFM

$$QS = \frac{0.12247 \times vs \times AS \times MD \times PS}{(TS + 459.69)}$$

$$= \frac{0.12247 \times 2134.6 \times 33618 \times 0.9054 \times 28.80}{(304.48 + 459.69)} = \underset{\substack{\text{Five Significant Digits Report} \\ \text{3 Significant Digits}}}{\underline{299760}}\ \text{DSC}$$

8. Percent isokinetic

$$PERI = \frac{1039.6 \times (TS + 459.69) \times VMSTD}{vs \times TT \times PS \times MD \times (DN)^2}$$

$$= \frac{1039.6 \times (304.48 + 459.69) \times 40.5837}{2134.6 \times 100 \times 28.80 \times 0.90548 \times (0.238)^2} = \underset{\text{(.001) Report (.1)}}{\underline{102.251}}$$

9. Particulate loading at standard conditions, gr/DSCF

$$CAN = 0.015432 \times (^{MF}/VMSTD) = 0.015432 \times (718.5 / 40.5887) = \underset{\substack{\text{6 Significant Digits Report} \\ \text{4 Significant Digits}}}{\underline{.273210}}\ \text{gr/DSCF}$$

10. Particulate loading at stack conditions, gr/ACF

$$CAT = \frac{17.636 \times CAN \times PS \times MD}{(TS + 459.69)}$$

$$= \frac{17.636 \times .273210 \times 28.80 \times .90548}{(304.48 + 459.69)} = \underset{\text{(.000001) Report (.0001)}}{\underline{.164429}}\ \text{gr/ACF}$$

11. Particulate emission rate, lbs/hr.

CAW = 0.008571 x CAN x QS

= 0.008571 x .273210 x 299760 = 701.94 lbs/hr.
5 Significant Digits Report
3 Significant Digits

12. Particulate loading at standard conditons, lb/DSCF

C = CAN ÷ 7,000 = .273210 ÷ 7,000 = .00003903 lb/DSCF
5 Significant Digits Report
3 Significant Digits

13. Particulate emission rate, lb/MMBTU

$$E = C \times F \times \frac{20.9}{20.9 - \%O_2}$$

(F = DSCF/MMBTU, use 9820 for bituminous coal and O_2)

$$E = .00003903 \times 9820 \times \frac{20.9}{20.9 - 7.3}$$

E = .58900 lb/MMBTU
5 Significant Digits Report
3 Significant Digits

KENVIRONS, INC.

Bechtel Calculations and Results

Facility LGE - CR6
Date of run 7-24-80
Project Number 90019
Date of Calculation 7-24-80
Run Number BEC-ESP-A-8
Calculated By TEG

Name		Description	Units	Value
	V1	Initial Meter Reading	dcf	478.632
	V2	Final Meter Reading	dcf	522.940
	VM	Dry gas volume, Meter condition	dcf	44.309
	PB	Barometer pressure @ (Lab.)	in. Hg.	29.82
	PBC	Barometer pressure corrected @ (console)	in. Hg.	29.77
	PM	Average orifice pressure drop (ΔH)	in. Hg.	0.607
	Y	Dry gas meter calibration factor (curve)		1.0245
	TM	Average meter temperature	°F	93.57
(1)	VMSTD	Dry gas volume, standard conditions	DSCF	43.1414
	VW	Total water collected	ml.	107.5
(2)	PMOS	Percent moisture by volume	%	10.5
(3)	MD	Mole fraction of dry gas	-	0.8950
	PCO2	Percent CO_2 by volume, dry	%	11.17
	PO2	Percent O_2 by volume, dry	%	7.33
	PCO	Percent CO by volume, dry	%	-
	PN2	Percent N_2 by volume, dry	%	81.50
(4)	MWD	Molecular weight, dry stack gas	-	30.0904
(5)	MW	Molecular weight, wet stack gas	-	28.8138
	DPS	Average stack gas velocity head (Avg.$\sqrt{\Delta P}$)	in. H_2O	0.54887
	TS	Average stack temperature	°F	309.34
	PS	Stack pressure, absolute	in. Hg.	28.72
(6)	vs	Average stack gas velocity	fpm	2280
	ID	Inside stack diameter	in.	-
	AS	Stack area	sq. in.	33618
(7)	QS	Stack flowrate, dry, standard conditions	DSCFM	314,000
	TT	Net time of run	min.	100
	DN	Nozzle diameter	in.	0.238
(8)	PERI	Percent isokinetic	%	103.9
	MF	Particulate weight, total	mg.	808.5
(9)	CAN	Particulate loading, standard conditions	gr/DSCF	.2892
(10)	CAT	Particulate loading, stack conditions	gr/ACF	.1705
(11)	CAW	Particulate emission rate	lb/hr	778
(12)	C	Particulate concentration, standard conditions	lb/DSCF	.0000413
	F	"F" factor	DSCF/MMBTU	9820
(13)	E	Emission rate (lb per million BTU)	lb/MMBTU	.625

1. Volume of dry gas sampled at standard conditions (68°F, 29.921" Hg.), DSCF

$$VMSTD = \frac{17.636 \times VM \times Y \left[PBC + \frac{PM}{13.6}\right]}{(TM + 459.69)} = \frac{17.636 \times 44.308 \times 1.0243 \left[29.77 + \frac{0.607}{13.6}\right]}{(93.57 + 459.69)} = 16?$$

43.1414 DSCF
(.0001) Report (.01)

2. Volume of water vapor at standard conditions, SCF

$VWV = 0.04707 \times VW = 0.04707 \times 107.5 =$ 5.0600 SCF
(.0001) Report (.01)

Percent moisture in stack gas

$$PMOS = \frac{100 \times VWV}{VMSTD + VWV} = \frac{100 \times 5.0600}{43.1414 + 5.0600} =$$ 10.497 %
5 Significant Digits Report
3 Significant Digits

3. Mole fraction of dry gas

$$MD = 1 - \left(\frac{VWV}{VMSTD + VWV}\right) = 1 - \left[\frac{5.0600}{43.1414 + 5.0600}\right] =$$ 0.89502
(.00001) Report (.001)

4. Molecular weight of dry stack gas

$MWD = (\%CO_2 \times 0.440) + (\%O_2 \times 0.320) + (\%CO + \%N_2) \times 0.280$

$= (11.17 \times 0.440) + (7.33 \times 0.320) + (81.50 \times 0.280) =$ 30.0804
(.0001) Report
(.(

5. Molecular weight of wet stack gas

$MW = MWD \times MD + 18.015\ (1 - MD) = 30.0804 \times 0.89502 + 18.015\ (1.00 - 0.89502) =$ 28.8138
(.0001) Repor
(.(

6. Average stack gas velocity at stack conditons, fpm

$$vs = 5129.4 \times Cp \times DPS \sqrt{\frac{TS + 459.69}{PS \times MW}}$$

$$= 5129.4 \times 0.84 \times 0.54887 \sqrt{\frac{309.34 + 459.69}{28.72 \times 28.8138}} = 2279.789 \text{ fp}$$

(.1) Report (10)

7. Volumetric flowrate at standard conditions, DSCFM

$$QS = \frac{0.12247 \times vs \times AS \times MD \times PS}{(TS + 459.69)}$$

$$= \frac{0.12247 \times 2279.788 \times 33618 \times 0.89502 \times 28.72}{(309.34 + 459.69)} = 313,740.04 \text{ DSC}$$

Five Significant Digits Report
3 Significant Digits

8. Percent isokinetic

$$PERI = \frac{1039.6 \times (TS + 459.69) \times VMSTD}{vs \times TT \times PS \times MD \times (DN)^2}$$

$$= \frac{1039.6 \times (309.34 + 459.69) \times 43.1414}{2279.788 \times 100 \times 28.72 \times 0.89502 \times (0.238)^2} = 103.905$$

(.001) Report (.1)

9. Particulate loading at standard conditions, gr/DSCF

$$CAN = 0.015432 \times (MF/VMSTD) = 0.015432 \times (808.5/43.1414) = .289207 \text{ gr/DSCF}$$

5 Significant Digits Report
4 Significant Digits

10. Particulate loading at stack conditions, gr/ACF

$$CAT = \frac{17.636 \times CAN \times PS \times MD}{(TS + 459.69)}$$

$$= \frac{17.636 \times .289207 \times 28.72 \times .89502}{(309.34 + 459.69)} = .170484 \text{ gr/ACF}$$

(.000001) Report (.0001)

11. Particulate emission rate, lbs/hr.

1.5

CAW = 0.008571 x CAN x QS

= 0.008571 x .289207 x 313740.04 = 777.70 lbs/hr.

5 Significant Digits Report
3 Significant Digits

12. Particulate loading at standard conditons, lb/DSCF

C = CAN ÷ 7,000 = .289207 ÷ 7,000 = .000041315 lb/DSCF

5 Significant Digits Report
3 Significant Digits

13. Particulate emission rate, lb/MMBTU

$$E = C \times F \times \frac{20.9}{20.9 - \%O_2}$$

(F = DSCF/MMBTU, use 9820 for bituminous coal and O_2)

$$E = .000041315 \times 9820 \times \frac{20.9}{20.9 - 7.33}$$

E = .62486 lb/MMBTU

5 Significant Digits Report
3 Significant Digits

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KENVIRONS, INC.

Bechtel Calculations and Results

Facility LGE - CR6

Project Number 80019

Run Number BEL-ESP-B-9

Date of run 7-25-80

Date of Calculation 7-25-80

Calculated By RCT

	Name	Description	Units	Value
	V1	Initial Meter Reading	dcf	529.649
	V2	Final Meter Reading	dcf	573.181
	VM	Dry gas volume, Meter condition	dcf	43.532
	PB	Barometer pressure @ (Lab.)	in. Hg.	29.84
	PBC	Barometer pressure corrected @ (console)	in. Hg.	29.79
	PM	Average orifice pressure drop (ΔH)	in. Hg.	0.5902
	Y	Dry gas meter calibration factor (curve)		1.0240
	TM	Average meter temperature	°F	98.90
(1)	VMSTD	Dry gas volume, standard conditions	DSCF	41.99
	VW	Total water collected	ml.	95.9
(2)	PMOS	Percent moisture by volume	%	9.7
(3)	MD	Mole fraction of dry gas	-	0.9029
	PCO2	Percent CO_2 by volume, dry	%	11.13
	PO2	Percent O_2 by volume, dry	%	8.50
	PCO	Percent CO by volume, dry	%	-0- ~~80.39~~
	PN2	Percent N_2 by volume, dry	%	80.37
(4)	MWD	Molecular weight, dry stack gas	-	30.1208
(5)	MW	Molecular weight, wet stack gas	-	28.94
	DPS	Average stack gas velocity head (Avg.$\sqrt{\Delta P}$)	in. H_2O	0.52846
	TS	Average stack temperature	°F	300.4
	PS	Stack pressure, absolute	in. Hg.	28.74
(6)	vs	Average stack gas velocity	fpm 2180	~~28.95~~ 2180
	ID	Inside stack diameter	in.	-
	AS	Stack area	sq. in.	33612
(7)	QS	Stack flowrate, dry, standard conditions	DSCFM	306,000
	TT	Net time of run	min.	100
	DN	Nozzle diameter	in.	0.238
(8)	PERI	Percent isokinetic	%	103.7
	MF	Particulate weight, total	mg.	907.4
(9)	CAN	Particulate loading, standard conditions	gr/DSCF	.3335
(10)	CAT	Particulate loading, stack conditions	gr/ACF	.2008
(11)	CAW	Particulate emission rate	lb/hr	875
(12)	C	Particulate concentration, standard conditions	lb/DSCF	.0000476
	F	"F" factor	DSCF/MMBTU	9820
(13)	E	Emission rate (lb per million BTU)	lb/MMBTU	.789

1. Volume of dry gas sampled at standard conditions (68°F, 29.921" Hg.), DSCF

$$\text{VMSTD} = \frac{17.636 \times \text{VM} \times \text{Y}\left[\text{PBC} + \frac{\text{PM}}{13.6}\right]}{(\text{TM} + 459.69)} = \frac{17.636 \times 43.532 \times 1.024\left[29.79 + \frac{0.59}{13.6}\right]}{(98.9 + 459.69)} =$$

41.9873 DSCF
(.0001) Report (.01)

2. Volume of water vapor at standard conditions, SCF

$$\text{VWV} = 0.04707 \times \text{VW} = 0.04707 \times 95.9 = 4.5140 \text{ SCF}$$

(.0001) Report (.01)

Percent moisture in stack gas

$$\text{PMOS} = \frac{100 \times \text{VWV}}{\text{VMSTD} + \text{VWV}} = \frac{100 \times 4.5140}{41.9873 + 4.5140} = 9.707\ \%$$

5 Significant Digits Report
3 Significant Digits

3. Mole fraction of dry gas

$$\text{MD} = 1 - \left(\frac{\text{VWV}}{\text{VMSTD} + \text{VWV}}\right) = 1 - \left[\frac{4.5140}{41.9873 + 4.5140}\right] = 0.90292$$

(.00001) Report (.001)

4. Molecular weight of dry stack gas

$$\text{MWD} = (\%\text{CO}_2 \times 0.440) + (\%\text{O}_2 \times 0.320) + (\%\text{CO} + \%\text{N}_2) \times 0.280$$

$$= (11.13 \times 0.440) + (9.50 \times 0.320) + (80.37 \times 0.280) = 30.1208$$

(.0001) Report
(.0

5. Molecular weight of wet stack gas

$$\text{MW} = \text{MWD} \times \text{MD} + 18.015\ (1 - \text{MD}) = 30.1209 \times 0.90292 + 18.015\ (1.00 - 0.90292) = 28.9456$$

(.0001) Report
(.0

16^{8}

6. Average stack gas velocity at stack conditons, fpm

$$vs = 5129.4 \times Cp \times DPS \cdot \sqrt{\frac{TS + 459.69}{PS \times MW}}$$

$$= 5129.4 \times 0.94 \times 0.52846 \sqrt{\frac{300.4 + 459.69}{28.74 \times 28.9456}} = \underline{\quad 2176.48 \quad} \text{ fpm}$$

(.1) Report (10)

7. Volumetric flowrate at standard conditions, DSCFM

$$QS = \frac{0.12247 \times vs \times AS \times MD \times PS}{(TS + 459.69)}$$

$$= \frac{0.12247 \times 2176.48 \times 33618 \times 0.90292 \times 28.74}{(300.4 + 459.69)} = \underline{\quad 305{,}933.63 \quad} \text{ DSCF}$$

Five Significant Digits Report
3 Significant Digits

8. Percent isokinetic

$$PERI = \frac{1039.6 \times (TS + 459.69) \times VMSTD}{vs \times TT \times PS \times MD \times (DN)^2}$$

$$= \frac{1039.6 \times (300.4 + 459.69) \times 41.9873}{2176.48 \times 100 \times 28.74 \times 0.90292 \times (0.238)^2} = \underline{\quad 103.706 \quad};$$

(.001) Report (.1)

9. Particulate loading at standard conditions, gr/DSCF

$$CAN = 0.015432 \times (^{MF}/VMSTD) = 0.015432 \times (907.4 \quad 141.9873) = \underline{\quad .333506 \quad} \text{ gr/DSCF}$$

6 Significant Digits Report
4 Significant Digits

10. Particulate loading at stack conditions, gr/ACF

$$CAT = \frac{17.636 \times CAN \times PS \times MD}{(TS + 459.69)}$$

$$= \frac{17.636 \times .333506 \times 28.74 \times .90292}{(300.4 + 459.69)} = \underline{\quad .200805 \quad} \text{ gr/ACF}$$

(.000001) Report (.0001)

11. Particulate emission rate, lbs/hr.

169

CAW = 0.008571 x CAN x QS

= 0.008571 x .333506 x 305933.63 = 874.52 lbs/hr.
5 Significant Digits Report
3 Significant Digits

12. Particulate loading at standard conditons, lb/DSCF

C = CAN ÷ 7,000 = .333506 ÷ 7,000 = .000047649 lb/DSCF
5 Significant Digits Report
3 Significant Digits

13. Particulate emission rate, lb/MMBTU

$$E = C \times F \times \frac{20.9}{20.9 - \%O_2}$$

(F = DSCF/MMBTU, use 9820 for bituminous coal and O_2)

$$E = .000047648 \times 9820 \times \frac{20.9}{20.9 - 8.50}$$

E = .78858 lb/MMBTU
5 Significant Digits Report
3 Significant Digits

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KENVIRONS, INC.

Bechtel Calculations and Results

Facility LGE – CR6

Date of run 7-26-80

Project Number 80019

Date of Calculation 7-26-80

Run Number BEC-ESP-A-10

Calculated By SB

	Name	**Description**	**Units**	**Value**
	V1	Initial Meter Reading	dcf	580.408
	V2	Final Meter Reading	dcf	623.248
	VM	Dry gas volume, Meter condition	dcf	42.840
	PB	Barometer pressure @ (Lab.)	in. Hg.	29.78
	PBC	Barometer pressure corrected @ (console)	in. Hg.	29.73
	PM	Average orifice pressure drop (ΔH)	in. Hg.	0.5612
	Y	Dry gas meter calibration factor (curve)		1.0235
	TM	Average meter temperature	°F	99.41
(1)	VMSTD	Dry gas volume, standard conditions	DSCF	41.18
	VW	Total water collected	ml.	92.9
(2)	PMOS	Percent moisture by volume	%	9.60
(3)	MD	Mole fraction of dry gas	-	0.904
	PCO2	Percent CO_2 by volume, dry	%	11.5
	PO2	Percent O_2 by volume, dry	%	7.0
	PCO	Percent CO by volume, dry	%	81.5
	PN2	Percent N_2 by volume, dry	%	
(4)	MWD	Molecular weight, dry stack gas	-	30.12
(5)	MW	Molecular weight, wet stack gas	-	28.96
	DPS	Average stack gas velocity head (Avg.$\sqrt{\Delta P}$)	in. H_2O	0.52345
	TS	Average stack temperature	°F	300.44
	PS	Stack pressure, absolute	in. Hg.	28.57
(6)	vs	Average stack gas velocity	fpm	2160
	ID	Inside stack diameter	in.	78x431
	AS	Stack area	sq. in.	33618
(7)	QS	Stack flowrate, dry, standard conditions	DSCFM	302000
	TT	Net time of run	min.	100
	DN	Nozzle diameter	in.	0.238
(8)	PERI	Percent isokinetic	%	102.9
	MF	Particulate weight, total	mg.	1216.7
(9)	CAN	Particulate loading, standard conditions	gr/DSCF	.4560
(10)	CAT	Particulate loading, stack conditions	gr/ACF	.2732
(11)	CAW	Particulate emission rate	lb/hr	1180.
(12)	C	Particulate concentration, standard conditions	lb/DSCF	.0000651
	F	"F" factor	DSCF/MMBTU	9820
(13)	E	Emission rate (lb per million BTU)	lb/MMBTU	.962

1. Volume of dry gas sampled at standard conditions (68°F, 29.921" Hg.), DSCF

$$\text{VMSTD} = \frac{17.636 \times \text{VM} \times \text{Y}\left[\text{PBC} + \frac{\text{PM}}{13.6}\right]}{(\text{TM} + 459.69)} = \frac{17.636 \times 42.840 \times 1.0235\left[29.13 + \frac{0.5619}{13.6}\right]}{(99.41 + 459.69)} =$$

41.1761 DSCF
(.0001) Report (.01)

2. Volume of water vapor at standard conditions, SCF

$$\text{VWV} = 0.04707 \times \text{VW} = 0.04707 \times 92.9 = 4.3728$$ SCF
(.0001) Report (.01)

Percent moisture in stack gas

$$\text{PMOS} = \frac{100 \times \text{VWV}}{\text{VMSTD} + \text{VWV}} = \frac{100 \times 4.3728}{41.1761 + 4.3728} = 9.6002$$ %
5 Significant Digits Report
3 Significant Digits

3. Mole fraction of dry gas

$$\text{MD} = 1 - \left(\frac{\text{VWV}}{\text{VMSTD} + \text{VWV}}\right) = 1 - \left[\frac{4.3728}{41.1761 + 4.3728}\right] = 0.90400$$
(.00001) Report (.001)

4. Molecular weight of dry stack gas

$$\text{MWD} = (\%CO_2 \times 0.440) + (\%O_2 \times 0.320) + (\%CO + \%N_2) \times 0.280$$

$$= (11.5 \times 0.440) + (7.0 \times 0.320) + (81.5 \times 0.280) = 30.1200$$
(.0001) Report
(.0

5. Molecular weight of wet stack gas

$$\text{MW} = \text{MWD} \times \text{MD} + 18.015\,(1 - \text{MD}) = 30.1200 \times 0.90400 + 18.015\,(1.00 - 0.904) = 28.957$$
(.0001) Report
(.0

6. Average stack gas velocity at stack conditons, fpm

n^2

$$vs = 5129.4 \times Cp \times DPS \sqrt{\frac{TS + 459.69}{PS \times MW}}$$

$$= 5129.4 \times 0.84 \times 0.52345 \sqrt{\frac{300.44 + 459.69}{28.57 \times 28.96}} = \underset{(.1)\ \text{Report}\ (10)}{\underline{2161.9}}\ \text{fp}$$

7. Volumetric flowrate at standard conditions, DSCFM

$$QS = \frac{0.12247 \times vs \times AS \times MD \times PS}{(TS + 459.69)}$$

$$= \frac{0.12247 \times 2161.9 \times 33618 \times 0.90400 \times 28.57}{(300.44 + 459.69)} = \underset{\text{Five Significant Digits Report}}{\underline{302430}}\ \text{DSC}$$

3 Significant Digits

8. Percent isokinetic

$$PERI = \frac{1039.6 \times (TS + 459.69) \times VMSTD}{vs \times TT \times PS \times MD \times (DN)^2}$$

$$= \frac{1039.6 \times (300.44 + 459.69) \times 41.1761}{2161.9 \times 100 \times 28.57 \times 0.90400 \times (0.238)^2} = \underset{(.001)\ \text{Report}\ (.1)}{\underline{102.880}}$$

9. Particulate loading at standard conditions, gr/DSCF

$$CAN = 0.015432 \times (^{MF}/VMSTD) = 0.015432 \times (1216.7\ /41.1761) = \underset{\text{6 Significant Digits Report}}{\underline{.455995}}\ \text{gr/DSCF}$$

4 Significant Digits

10. Particulate loading at stack conditions, gr/ACF

$$CAT = \frac{17.636 \times CAN \times PS \times MD}{(TS + 459.69)}$$

$$= \frac{17.636 \times .455995 \times 28.57 \times .90400}{(300.44 + 459.69)} = \underset{(.000001)\ \text{Report}\ (.0001)}{\underline{.273244}}\ \text{gr/ACF}$$

n3

11. Particulate emission rate, lbs/hr.

CAW = 0.008571 x CAN x QS

= 0.008571 x .455995 x 302430 = 1182.0 lbs/hr.
5 Significant Digits Report
3 Significant Digits

12. Particulate loading at standard conditons, lb/DSCF

C = CAN ÷ 7,000 = .455995 ÷ 7,000 = .000065142 lb/DSCF
5 Significant Digits Report
3 Significant Digits

13. Particulate emission rate, lb/MMBTU

$$E = C \times F \times \frac{20.9}{20.9 - \%O_2}$$

(F = DSCF/MMBTU, use 9820 for bituminous coal and O_2)

$$E = .000065142 \times 9820 \times \frac{20.9}{20.9 - 7.0}$$

E = .96184 lb/MMBTU
5 Significant Digits Report
3 Significant Digits

174

KENVIRONS, INC.

[illegible] Calculations and Results

Facility L.G.+E.
Date of run 7-17-80
Project Number 80019
Date of Calculation 7-17-80
Run Number BEC-ESP-8-1
Calculated By RST

Name	**Description**	**Units**	**Value**
V1	Initial Meter Reading	dcf	792.403
V2	Final Meter Reading	dcf	841.100
VM	Dry gas volume, Meter condition	dcf	48.697
PB	Barometer pressure @ (Lab.)	in. Hg.	29.66
PBC	Barometer pressure corrected @ (console)	in. Hg.	29.61
PM	Average orifice pressure drop (ΔH)	in. Hg.	0.706
Y	Dry gas meter calibration factor (curve)		1.037
TM	Average meter temperature	°F	126.39
(1) VMSTD	Dry gas volume, standard conditions	DSCF	45.07
VW	Total water collected	ml.	89.5
(2) PMOS	Percent moisture by volume	%	8.55
(3) MD	Mole fraction of dry gas	-	0.9145
PCO2	Percent CO_2 by volume, dry	%	12.0
PO2	Percent O_2 by volume, dry	%	7.33
PCO	Percent CO by volume, dry	%	-0-
PN2	Percent N_2 by volume, dry	%	80.37
(4) MWD	Molecular weight, dry stack gas	-	30.21
(5) MW	Molecular weight, wet stack gas	-	29.17
DPS	Average stack gas velocity head (Avg.$\sqrt{\Delta P}$)	in. H_2O	0.55958
TS	Average stack temperature	°F	282.38
PS	Stack pressure, absolute	in. Hg.	28.50
(6) vs	Average stack gas velocity	fpm	2250
ID	Inside stack diameter	in.	—
AS	Stack area	sq. in.	22615
(7) QS	Stack flowrate, dry, standard conditions	DSCFM	229,000
TT	Net time of run	min.	100
DN	Nozzle diameter	in.	0.241
(8) PERI	Percent isokinetic	%	100.9
MF	Particulate weight, total	mg.	962.9
(9) CAN	Particulate loading, standard conditions	gr/DSCF	.3297
(10) CAT	Particulate loading, stack conditions	gr/ACF	.2039
(11) CAW	Particulate emission rate	lb/hr	930
(12) C	Particulate concentration, standard conditions	lb/DSCF	.0000471
F	"F" factor	DSCF/MMBTU	9820
(13) E	Emission rate (lb per million BTU)	lb/MMBTU	.712

Volume of dry gas sampled at standard conditions (68°F, 29.921" Hg.), DSCF 126

$$VMSTD = \frac{17.636 \times VM \times Y \left[PBC + \frac{PM}{13.6}\right]}{(TM + 459.69)} = \frac{17.636 \times 45.197 \times 1.037 \left[30.61 + \frac{0.706}{13.6}\right]}{(126.5 + 459.69)} =$$

45.0737 DSCF
(.0001) Report (.01)

2. Volume of water vapor at standard conditions, SCF

$VWV = 0.04707 \times VW = 0.04707 \times 59.5 =$ 4.2128 SCF
(.0001) Report (.01)

Percent moisture in stack gas

$$PMOS = \frac{100 \times VWV}{VMSTD + VWV} = \frac{100 \times 4.2128}{45.0737 + 4.2128} =$$ 8.5476 %
5 Significant Digits Report
3 Significant Digits

Mole fraction of dry gas

$$D = 1 - \left(\frac{VWV}{VMSTD + VWV}\right) = 1 - \left[\frac{4.2128}{45.0737 + 4.2128}\right] =$$ 0.91452
(.00001) Report (.001)

4. Molecular weight of dry stack gas

$MWD = (\%CO_2 \times 0.440) + (\%O_2 \times 0.320) + (\%CO + \%N_2) \times 0.280$

$= (12.0 \times 0.440) + (7.33 \times 0.320) + (80.67 \times 0.280) =$ 30.2132
(.0001) Report (.01)

5. Molecular weight of wet stack gas

$MW = MWD \times MD + 18.015\ (1 - MD) = 30.2132 \times 0.91452 + 18.015\ (1.00 - 0.91452) =$ 29.1705
(.0001) Report (.01)

176

. Average stack gas velocity at stack conditons, fpm

$$s = 5129.4 \times Cp \times DPS \sqrt{\frac{TS + 459.69}{PS \times MW}}$$

$$5129.4 \times 0.84 \times 0.55959 \sqrt{\frac{283.38 + 459.69}{28.50 \times 29.1705}} = \frac{2279.4}{(.1)\ \text{Report}\ (10)}\ \text{fpm}$$

/. Volumetric flowrate at standard conditions, DSCFM

$$JS = \frac{0.12247 \times vs \times AS \times MD \times PS}{(TS + 459.69)}$$

$$= \frac{0.12247 \times 2279.4 \times 23618 \times 0.91452 \times 28.50}{(283.38 + 459.69)} = \frac{329177.7}{\text{Five Significant Digits Report 3 Significant Digits}}\ \text{DSCFM}$$

I. Percent isokinetic

$$ERI = \frac{1039.6 \times (TS + 459.69) \times VMSTD}{vs \times TT \times PS \times MD \times (DN)^2}$$

$$= \frac{1039.6 \times (283.35 + 459.69) \times 45.0737}{2279.4 \times 100 \times 28.50 \times 0.91452 \times (0.241)^2} = \frac{100.908}{(.001)\ \text{Report}\ (.1)}\ \%$$

9. Particulate loading at standard conditions, gr/DSCF

$$AN = 0.015432 \times (MF/VMSTD) = 0.015432 \times (962.9 / 45.0737) = \frac{.329671}{\text{6 Significant Digits Report 4 Significant Digits}}\ \text{gr/DSCF}$$

10. Particulate loading at stack conditions, gr/ACF

$$AT = \frac{17.636 \times CAN \times PS \times MD}{(TS + 459.69)}$$

$$= \frac{17.636 \times .329671 \times 28.50 \times .91452}{(283.38 + 459.69)} = \frac{.203934}{(.000001)\ \text{Report}\ (.0001)}\ \text{gr/ACF}$$

11. Particulate emission rate, lbs/hr.

CAW = 0.008571 x CAN x QS

= 0.008571 x .329671 x 329177.7 = 930.13 lbs/hr.
5 Significant Digits Report
3 Significant Digits

12. Particulate loading at standard conditons, lb/DSCF

C = CAN ÷ 7,000 = .329671 ÷ 7,000 = .000047095 lb/DSCF
5 Significant Digits Report
3 Significant Digits

13. Particulate emission rate, lb/MMBTU

$$E = C \times F \times \frac{20.9}{20.9 - \%O_2}$$

(F = DSCF/MMBTU, use 9820 for bituminous coal and O_2)

$$E = .000047095 \times 9820 \times \frac{20.9}{20.9 - 7.33}$$

E = .71228 lb/MMBTU
5 Significant Digits Report
3 Significant Digits

KENVIRONS, INC.

Calculations and Results

Lenoir:

Facility LbE CE 6

Date of run 7-18-80

Project Number 80019

Date of Calculation 7-18-80

Run Number REC-ESP-B-2

Calculated By PHM / RST

Name	Description	Units	Value
V1	Initial Meter Reading	dcf	848.142
V2	Final Meter Reading	dcf	894.131
VM	Dry gas volume, Meter condition	dcf	45.989
PB	Barometer pressure @ (Lab.)	in. Hg.	29.80
PBC	Barometer pressure corrected @ (console)	in. Hg.	29.75
PM	Average orifice pressure drop (ΔH)	in. Hg.	1.647 ✓
Y	Dry gas meter calibration factor (curve)		1.036
TM	Average meter temperature	°F	125.10 ✓
(1) VMSTD	Dry gas volume, standard conditions	DSCF	47.82
VW	Total water collected	ml.	93.9
(2) PMOS	Percent moisture by volume	%	9.36
(3) MD	Mole fraction of dry gas	-	0.906
PCO2	Percent CO_2 by volume, dry	%	12.33
PO2	Percent O_2 by volume, dry	%	6.83
PCO	Percent CO by volume, dry	%	-0-
PN2	Percent N_2 by volume, dry	%	80.84
(4) MWD	Molecular weight, dry stack gas	-	30.25
(5) MW	Molecular weight, wet stack gas	-	29.10
DPS	Average stack gas velocity head (Avg.$\sqrt{\Delta P}$)	in. H_2O	0.50890
TS	Average stack temperature	°F	304.06
PS	Stack pressure, absolute	in. Hg.	28.64
(6) vs	Average stack gas velocity	fpm	2100
ID	Inside stack diameter	in.	-
AS	Stack area	sq. in.	33618
(7) QS	Stack flowrate, dry, standard conditions	DSCFM	294000
TT	Net time of run	min.	100
DN	Nozzle diameter	in.	0.244
(8) PERI	Percent isokinetic	%	107.5
MF	Particulate weight, total	mg.	482.5
(9) CAN	Particulate loading, standard conditions	gr/DSCF	.1739
(10) CAT	Particulate loading, stack conditions	gr/ACF	.1042
(11) CAW	Particulate emission rate	lb/hr	438.
(12) C	Particulate concentration, standard conditions	lb/DSCF	.0000249
F	"F" factor	DSCF/MMBTU	9820
(13) E	Emission rate (lb per million BTU)	lb/MMBTU	.362

. Volume of dry gas sampled at standard conditions (68°F, 29.921" Hg.), DSCF

175

$$.MSTD = \frac{17.636 \times VM \times Y \left[PBC + \frac{PM}{13.6}\right]}{(TM + 459.69)} = \frac{17.636 \times 45.989 \times 1.050 \left[29.75 + \frac{.647}{13.6}\right]}{(125.10 + 459.69)} =$$

42.8199 DSCF
(.0001) Report (.01)

2. Volume of water vapor at standard conditions, SCF

$VWV = 0.04707 \times VW = 0.04707 \times 93.9 =$ 4.4199 SCF
(.0001) Report (.01)

Percent moisture in stack gas

$$PMOS = \frac{100 \times VWV}{VMSTD + VWV} = \frac{100 \times 4.4199}{42.8199 + 4.4199} =$$

9.36 %
5 Significant Digits Report
3 Significant Digits

. Mole fraction of dry gas

$$D = 1 - \left(\frac{VWV}{VMSTD + VWV}\right) = 1 - \left[\frac{4.4199}{42.8199 + 4.4199}\right] =$$

.90643
~~9.0643~~ ~~[illegible]~~
(.00001) Report (.001)

4. Molecular weight of dry stack gas

$MWD = (\%CO_2 \times 0.440) + (\%O_2 \times 0.320) + (\%CO + \%N_2) \times 0.280$

$= (12.33 \times 0.440) + (6.83 \times 0.320) + (80.84 \times 0.280) =$ 30.2460
(.0001) Report (.01)

5. Molecular weight of wet stack gas

$MW = MWD \times MD + 18.015 (1 - MD) = 30.246 \times 0.90643 + 18.015 (1.00 - 0.90643) =$ 29.1015
(.0001) Report (.01)

100

6. Average stack gas velocity at stack conditons, fpm

$$vs = 5129.4 \times Cp \times DPS \sqrt{\frac{TS + 459.69}{PS \times MW}}$$

$$= 5129.4 \times .84 \times 0.50890 \sqrt{\frac{304.06 + 459.69}{28.64 \times 29.1015}} = \underset{(.1)\ \text{Report}\ (10)}{\underline{\quad 2098 \quad}}\ \text{fpm}$$

7. Volumetric flowrate at standard conditions, DSCFM

$$QS = \frac{0.12247 \times vs \times AS \times MD \times PS}{(TS + 459.69)}$$

$$= \frac{0.12247 \times 2098 \times 33618 \times .90643 \times 28.64}{(304.06 + 459.69)} = \underset{\substack{\text{Five Significant Digits Report}\\ \text{3 Significant Digits}}}{\underline{\quad 293604 \quad}}\ \text{DSCF}$$

8. Percent isokinetic

$$PERI = \frac{1039.6 \times (TS + 459.69) \times VMSTD}{vs \times TT \times PS \times MD \times (DN)^2}$$

$$= \frac{1039.6 \times (304.06 + 459.69) \times 42.8199}{2098 \times 100 \times 28.64 \times .90643 \times .05808} = \underset{(.001)\ \text{Report}\ (.1)}{\underline{\quad 107.5 \quad}}\ \%$$

9. Particulate loading at standard conditions, gr/DSCF

$$CAN = 0.015432 \times (MF/VMSTD) = 0.015432 \times (482.5 / 42.8199) = \underset{\substack{\text{5 Significant Digits Report}\\ \text{4 Significant Digits}}}{\underline{\quad .173890 \quad}}\ \text{gr/DSCF}$$

10. Particulate loading at stack conditions, gr/ACF

$$CAT = \frac{17.636 \times CAN \times PS \times MD}{(TS + 459.69)}$$

$$= \frac{17.636 \times .173890 \times 28.64 \times .90643}{(304.06 + 459.69)} = \underset{(.000001)\ \text{Report}\ (.0001)}{\underline{\quad .104239 \quad}}\ \text{gr/ACF}$$

11. Particulate emission rate, lbs/hr.

$CAW = 0.008571 \times CAN \times QS$

$= 0.008571 \times .173890 \times 293604 = \underline{437.59}$ lbs/hr.
5 Significant Digits Report
3 Significant Digits

12. Particulate loading at standard conditons, lb/DSCF

$C = CAN \div 7{,}000 = \underline{.173890} \div 7{,}000 = \underline{.000024841}$ lb/DSCF
5 Significant Digits Report
3 Significant Digits

13. Particulate emission rate, lb/MMBTU

$$E = C \times F \times \frac{20.9}{20.9 - \%O_2}$$

(F = DSCF/MMBTU, use 9820 for bituminous coal and O_2)

$$E = \underline{.000024841} \times \underline{9820} \times \frac{20.9}{20.9 - \underline{6.83}}$$

$E = \underline{.36235}$ lb/MMBTU
5 Significant Digits Report
3 Significant Digits

KENVIRONS, INC.

Bechtel Calculations and Results

Facility LGE CR6

Project Number 80019

Run Number BEC-ESP-B-3

Date of run 7-19-80

Date of Calculation 7-19-80

Calculated By RCT

Name	Description	Units	Value
V1	Initial Meter Reading	dcf	901.700
V2	Final Meter Reading	dcf	952.853
VM	Dry gas volume, Meter condition	dcf	51.153
PB	Barometer pressure @ (Lab.)	in. Hg.	29.86
PBC	Barometer pressure corrected @ (console)	in. Hg.	29.81
PM	Average orifice pressure drop (ΔH)	in. Hg.	0.790
Y	Dry gas meter calibration factor (curve)		1.039
TM	Average meter temperature	°F	116.87
(1) VMSTD	Dry gas volume, standard conditions	DSCF	48.56
VW	Total water collected	ml.	94.9
(2) PMOS	Percent moisture by volume	%	8.42
(3) MD	Mole fraction of dry gas	-	0.916
PCO2	Percent CO_2 by volume, dry	%	11.75
PO2	Percent O_2 by volume, dry	%	7.75
PCO	Percent CO by volume, dry	%	-0-
PN2	Percent N_2 by volume, dry	%	80.5
(4) MWD	Molecular weight, dry stack gas	-	30.19
(5) MW	Molecular weight, wet stack gas	-	29.16
DPS	Average stack gas velocity head (Avg.$\sqrt{\Delta P}$)	in. H_2O	0.57119
TS	Average stack temperature	°F	294.52
PS	Stack pressure, absolute	in. Hg.	28.70
(6) vs	Average stack gas velocity	fpm	2340
ID	Inside stack diameter	in.	—
AS	Stack area	sq. in.	33619
(7) QS	Stack flowrate, dry, standard conditions	DSCFM	335,000
TT	Net time of run	min.	100
DN	Nozzle diameter	in.	0.241
(8) PERI	Percent isokinetic	%	~~106.7~~ 106.8
MF	Particulate weight, total	mg.	1515.9
(9) CAN	Particulate loading, standard conditions	gr/DSCF	.4818
(10) CAT	Particulate loading, stack conditions	gr/ACF	.2961
(11) CAW	Particulate emission rate	lb/hr	1380.
(12) C	Particulate concentration, standard conditions	lb/DSCF	.0000688
F	"F" factor	DSCF/MMBTU	9820
(13) E	Emission rate (lb per million BTU)	lb/MMBTU	1.07

. Volume of dry gas sampled at standard conditions (68°F, 29.921" Hg.), DSCF

183

$$VMSTD = \frac{17.636 \times VM \times Y \left[PBC + \frac{PM}{13.6}\right]}{(TM + 459.69)} = \frac{17.636 \times 51.153 \times 1.039 \left[29.81 + \frac{0.79}{13.6}\right]}{(116.57 + 459.69)} =$$

48.5567 DSCF
(.0001) Report (.01)

2. Volume of water vapor at standard conditions, SCF

$VWV = 0.04707 \times VW = 0.04707 \times 94.9 =$ 4.4669 SCF
(.0001) Report (.01)

Percent moisture in stack gas

$$\%MOS = \frac{100 \times VWV}{VMSTD + VWV} = \frac{100 \times 4.4669}{48.5567 + 4.4669} =$$

8.42 %
5 Significant Digits Report
3 Significant Digits

3. Mole fraction of dry gas

$$MD = 1 - \left(\frac{VWV}{VMSTD + VWV}\right) = 1 - \left[\frac{4.4669}{48.5567 + 4.4669}\right] =$$

0.91576
(.00001) Report (.001)

4. Molecular weight of dry stack gas

$MWD = (\%CO_2 \times 0.440) + (\%O_2 \times 0.320) + (\%CO + \%N_2) \times 0.280$

$= (11.75 \times 0.440) + (7.75 \times 0.320) + (80.5 \times 0.280) =$ 30.19
(.0001) Report (.01

5. Molecular weight of wet stack gas

$MW = MWD \times MD + 18.015\,(1 - MD) = 30.19 \times 0.91576 + 18.015\,(1.00 - 0.91576) =$ 29.1644
(.0001) Report (.01

6. Average stack gas velocity at stack conditons, fpm 10^{4}

$$s = 5129.4 \times Cp \times DPS \sqrt{\frac{TS + 459.69}{PS \times MW}}$$

$$= 5129.4 \times 0.94 \times 0.57119 \sqrt{\frac{294.52 + 459.69}{28.70 \times 29.1644}} = \underset{(.1)\ \text{Report}\ (10)}{\underline{2336.17}}\ \text{fpm}$$

.. Volumetric flowrate at standard conditions, DSCFM

$$S = \frac{0.12247 \times vs \times AS \times MD \times PS}{(TS + 459.69)}$$

$$= \frac{0.12247 \times 2336.17 \times 33618 \times 0.91576 \times 28.70}{(294.52 + 459.69)} = \underline{335,179}\ \text{DSCF}$$

Five Significant Digits Report
3 Significant Digits

. Percent isokinetic

$$ERI = \frac{1039.6 \times (TS + 459.69) \times VMSTD}{vs \times TT \times PS \times MD \times (DN)^2}$$

$$\frac{1039.6 \times (294.52 + 459.69) \times 48.5567}{2336.17 \times 100 \times 28.70 \times 0.91576 \times (0.241)^2} = \underset{(.001)\ \text{Report}\ (.1)}{\underline{106.759}}\ \%$$

. Particulate loading at standard conditions, gr/DSCF

$$AN = 0.015432 \times (^{MF}/VMSTD) = 0.015432 \times (1515.9\ /48.5567) = \underline{.481774}\ \text{gr/DSCF}$$

5 Significant Digits Report
4 Significant Digits

0. Particulate loading at stack conditions, gr/ACF

$$AT = \frac{17.636 \times CAN \times PS \times MD}{(TS + 459.69)}$$

$$\frac{17.636 \times .481774 \times 28.70 \times .91576}{(294.52 + 459.69)} = \underset{(.000001)\ \text{Report}\ (.0001)}{\underline{.296084}}\ \text{gr/ACF}$$

15

11. Particulate emission rate, lbs/hr.

CAW = 0.008571 x CAN x QS

= 0.008571 x .481774 x 335179 = 1384.0 lbs/hr.
5 Significant Digits Report
3 Significant Digits

12. Particulate loading at standard conditons, lb/DSCF

C = CAN ÷ 7,000 = .481774 ÷ 7,000 = .000068824 lb/DSCF
5 Significant Digits Report
3 Significant Digits

13. Particulate emission rate, lb/MMBTU

$$E = C \times F \times \frac{20.9}{20.9 - \%O_2}$$

(F = DSCF/MMBTU, use 9820 for bituminous coal and O_2)

$$E = .000068824 \times 9820 \times \frac{20.9}{20.9 - 7.75}$$

= 1.0742 lb/MMBTU
5 Significant Digits Report
3 Significant Digits

186

KENVIRONS, INC.

Calculations and Results

Facility LG&E Cane Run 6 ESP-B[illegible] Date of run 7/20/80

Project Number 80019 Date of Calculation 7/20/80

Run Number K DEC-ESP-B-4 Calculated By PHM

Name	Description	Units	Value
V1	Initial Meter Reading	dcf	961.900
V2	Final Meter Reading	dcf	1007.129
VM	Dry gas volume, Meter condition	dcf	45.229
PB	Barometer pressure @ (Lab.)	in. Hg.	29.85
PBC	Barometer pressure corrected @ (console)	in. Hg.	29.50
PM	Average orifice pressure drop (ΔH)	in. Hg.	0.6336
Y	Dry gas meter calibration factor (curve)		1.0355
TM	Average meter temperature	°F	119.27
(1) VMSTD	Dry gas volume, standard conditions	DSCF	42.57
VW	Total water collected	ml.	68.5
(2) PMOS	Percent moisture by volume	%	7.04
(3) MD	Mole fraction of dry gas	-	0.929
PCO2	Percent CO_2 by volume, dry	%	12.12
PO2	Percent O_2 by volume, dry	%	9.0
PCO	Percent CO by volume, dry	%	-0-
PN2	Percent N_2 by volume, dry	%	78.88
(4) MWD	Molecular weight, dry stack gas	-	30.30
(5) MW	Molecular weight, wet stack gas	-	29.43
DPS	Average stack gas velocity head (Avg. $\sqrt{\Delta P}$)	in. H_2O	0.504267
TS	Average stack temperature	°F	271.86
PS	Stack pressure, absolute	in. Hg.	28.75
(6) vs	Average stack gas velocity	fpm	2020
ID	Inside stack diameter	in.	-
AS	Stack area	sq. in.	33618
(7) QS	Stack flowrate, dry, standard conditions	DSCFM	304,000
TT	Net time of run	min.	100
DN	Nozzle diameter	in.	0.241
(8) PERI	Percent isokinetic	%	103.3
MF	Particulate weight, total	mg.	899.4
(9) CAN	Particulate loading, standard conditions	gr/DSCF	.3223
(10) CAT	Particulate loading, stack conditions	gr/ACF	.2077
(11) CAW	Particulate emission rate	lb/hr	839
(12) C	Particulate concentration, standard conditions	lb/DSCF	.0000465
F	"F" factor	DSCF/MMBTU	9820
(13) E	Emission rate (lb per million BTU)	lb/MMBTU	.801

. Volume of dry gas sampled at standard conditions (68°F, 29.921" Hg.), DSCF 87

$$vMSTD = \frac{17.636 \times VM \times Y \left[PBC + \frac{PM}{13.6}\right]}{(TM + 459.69)} = \frac{17.636 \times 45.229 \times 1.0355 \left[29.90 + \frac{0.6376}{13.6}\right]}{(119.27 + 459.69)} =$$

42.58075 DSCF
(.0001) Report (.01)

. Volume of water vapor at standard conditions, SCF

$VWV = 0.04707 \times VW = 0.04707 \times 68.5 =$ 3.2243 SCF
(.0001) Report (.01)

Percent moisture in stack gas

$$\%MOS = \frac{100 \times VWV}{VMSTD + VWV} = \frac{100 \times 3.2243}{42.58075 + 3.2243} =$$ 7.04 %

5 Significant Digits Report
3 Significant Digits

. Mole fraction of dry gas

$$MD = 1 - \left(\frac{VWV}{VMSTD + VWV}\right) = 1 - \left[\frac{3.2243}{42.58075 + 3.2243}\right] =$$ .929608

(.00001) Report (.001)

4. Molecular weight of dry stack gas

$MWD = (\%CO_2 \times 0.440) + (\%O_2 \times 0.320) + (\%CO + \%N_2) \times 0.280$

$= (12.12 \times 0.440) + (9.0 \times 0.320) + (78.88 \times 0.280) =$ 30.2992
(.0001) Report (.01)

5. Molecular weight of wet stack gas

$MW = MWD \times MD + 18.015\ (1 - MD) = 30.2992 \times 0.929608 + 18.015\ (1.00 - 0.929608) =$ 29.4345
(.0001) Report (.01)

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6. Average stack gas velocity at stack conditqns, fpm

$$s = 5129.4 \times Cp \times DPS \sqrt{\frac{TS + 459.69}{PS \times MW}}$$

$$= 5129.4 \times 0.84 \times 0.504267 \sqrt{\frac{271.86 + 459.69}{28.75 \times 29.4345}} = \underset{(.1)\ \text{Report}\ (10)}{\underline{2020.14}}\ \text{fpm}$$

. Volumetric flowrate at standard conditions, DSCFM

$$5 = \frac{0.12247 \times vs \times AS \times MD \times PS}{(TS + 459.69)}$$

$$= \frac{0.12247 \times 2020.14 \times 33618 \times 0.929608 \times 28.75}{(271.86 + 459.69)} = \underline{303862.24}\ \text{DSCFM}$$

Five Significant Digits Report
3 Significant Digits

. Percent isokinetic

$$ERI = \frac{1039.6 \times (TS + 459.69) \times VMSTD}{vs \times TT \times PS \times MD \times (DN)^2}$$

$$\frac{1039.6 \times (271.86 + 459.69) \times 42.58075}{2020.14 \times 100 \times 28.75 \times 0.929608 \times (0.241)^2} = \underset{(.001)\ \text{Report}\ (.1)}{\underline{103.269}}\ \%$$

. Particulate loading at standard conditions, gr/DSCF

$$AN = 0.015432 \times (^{MF}/VMSTD) = 0.015432 \times (899.4\ /42.58075) = \underline{.322334}\ \text{gr/DSCF}$$

5 Significant Digits Report
4 Significant Digits

). Particulate loading at stack conditions, gr/ACF

$$T = \frac{17.636 \times CAN \times PS \times MD}{(TS + 459.69)}$$

$$\frac{17.636 \times .322334 \times 28.75 \times .929608}{(271.86 + 459.69)} = \underset{(.000001)\ \text{Report}\ (.0001)}{\underline{.207682}}\ \text{gr/ACF}$$

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11. Particulate emission rate, lbs/hr.

CAW = 0.008571 x CAN x QS

= 0.008571 x .322334 x 303862.24 = 839.49 ______ lbs/hr.
5 Significant Digits Report
3 Significant Digits

12. Particulate loading at standard conditons, lb/DSCF

C = CAN ÷ 7,000 = .322334 ÷ 7,000 = .00004647 lb/DSCF
5 Significant Digits Report
3 Significant Digits

13. Particulate emission rate, lb/MMBTU

$$F = C \times F \times \frac{20.9}{20.9 - \%O_2}$$

F = DSCF/MMBTU, use 9820 for bituminous coal and O_2)

$$- = .00004647 \times 9820 \times \frac{20.9}{20.9 - 9.0}$$

= .80146 lb/MMBTU
5 Significant Digits Report
3 Significant Digits

AO

KENVIRONS, INC.

Bechtel

Calculations and Results

Facility LGE – CR6 Date of run 7-21-80

Project Number 80019 Date of Calculation 7-21-80

Run Number BEC – ESP – B – 5 Calculated By ______

Name	Description	Units	Value
V1	Initial Meter Reading	dcf	14.406
V2	Final Meter Reading	dcf	58.595
VM	Dry gas volume, Meter condition	dcf	44.189
PB	Barometer pressure @ (Lab.)	in. Hg.	29.83
PBC	Barometer pressure corrected @ (console)	in. Hg.	29.83
PM	Average orifice pressure drop (ΔH)	in. Hg.	0.6128
Y	Dry gas meter calibration factor (curve)		1.035
TM	Average meter temperature	°F	116.47
(1) VMSTD	Dry gas volume, standard conditions	DSCF	41.82
VW	Total water collected	ml.	97.3
(2) PMOS	Percent moisture by volume	%	9.869
(3) MD	Mole fraction of dry gas	-	0.901
PCO2	Percent CO_2 by volume, dry	%	13.0
PO2	Percent O_2 by volume, dry	%	9.33
PCO	Percent CO by volume, dry	%	-0-
PN2	Percent N_2 by volume, dry	%	77.67
(4) MWD	Molecular weight, dry stack gas	-	30.41
(5) MW	Molecular weight, wet stack gas	-	29.17
DPS	Average stack gas velocity head (Avg.$\sqrt{\Delta P}$)	in. H_2O	0.49972
TS	Average stack temperature	°F	308.34
PS	Stack pressure, absolute	in. Hg.	28.73
(6) vs	Average stack gas velocity	fpm	2010
ID	Inside stack diameter	in.	—
AS	Stack area	sq. in.	23619
(7) QS	Stack flowrate, dry, standard conditions	DSCFM	280,000
TT	Net time of run	min.	100
DN	Nozzle diameter	in.	0.241
(8) PERI	Percent isokinetic	%	109.97
MF	Particulate weight, total	mg.	1068.6
(9) CAN	Particulate loading, standard conditions	gr/DSCF	.3943
(10) CAT	Particulate loading, stack conditions	gr/ACF	.2354
(11) CAW	Particulate emission rate	lb/hr	947
(12) C	Particulate concentration, standard conditions	lb/DSCF	.0000563
F	"F" factor	DSCF/MMBTU	9820
(13) E	Emission rate (lb per million BTU)	lb/MMBTU	.920

. Volume of dry gas sampled at standard conditions (68°F, 29.921" Hg.), DSCF

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$$.MSTD = \frac{17.636 \times VM \times Y \left[PBC + \frac{PM}{13.6}\right]}{(TM + 459.69)} = \frac{17.636 \times 44.189 \times 1.035 \left[29.93 + \frac{0.6278}{13.6}\right]}{(116.47 + 459.69)} =$$

41.9235 DSCF
(.0001) Report (.01)

2. Volume of water vapor at standard conditions, SCF

$$VWV = 0.04707 \times VW = 0.04707 \times 97.3 = 4.5799$$

(.0001) Report (.01) SCF

Percent moisture in stack gas

$$PMOS = \frac{100 \times VWV}{VMSTD + VWV} = \frac{100 \times 4.5799}{41.8235 + 4.5799} = 9.869$$

%
5 Significant Digits Report
3 Significant Digits

3. Mole fraction of dry gas

$$MD = 1 - \left(\frac{VWV}{VMSTD + VWV}\right) = 1 - \left[\frac{4.5799}{41.9235 + 4.5799}\right] = 0.90120$$

(.00001) Report (.001)

4. Molecular weight of dry stack gas

$$MWD = (\%CO_2 \times 0.440) + (\%O_2 \times 0.320) + (\%CO + \%N_2) \times 0.280$$

$$= (13.0 \times 0.440) + (8.33 \times 0.320) + (78.67 \times 0.280) = 30.4132$$

(.0001) Report
(.01)

5. Molecular weight of wet stack gas

$$MW = MWD \times MD + 18.015\ (1 - MD) = 30.4132 \times 0.9013 + 18.015\ (1.00 - 0.9013) = 29.1995$$

(.0001) Report
(.01)

6. Average stack gas velocity at stackconditons, fpm

$$s = 5129.4 \times Cp \times DPS \sqrt{\frac{TS + 459.69}{PS \times MW}}$$

$$= 5129.4 \times 0.84 \times 0.49872 \sqrt{\frac{305.34 + 459.69}{29.73 \times 29.1995}} = \underset{(.1)\ \text{Report}\ (10)}{\underline{2011.24}}\ \text{fpm}$$

. Volumetric flowrate at standard conditions, DSCFM

$$S = \frac{0.12247 \times vs \times AS \times MD \times PS}{(TS + 459.69)}$$

$$= \frac{0.12247 \times 2011.24 \times 3368 \times 0.9013 \times 29.73}{(305.34 + 459.69)} = \underline{280280}\ \text{DSCFM}$$

Five Significant Digits Report
3 Significant Digits

. Percent isokinetic

$$PERI = \frac{1039.6 \times (TS + 459.69) \times VMSTD}{vs \times TT \times PS \times MD \times (DN)^2}$$

$$\frac{1039.6 \times (305.34 + 459.69) \times 41.8235}{2011.24 \times 100 \times 29.73 \times 0.90130 \times (0.241)^2} = \underset{(.001)\ \text{Report}\ (.1)}{\underline{109.97}}\ \%$$

. Particulate loading at standard conditions, gr/DSCF

$$AN = 0.015432 \times (^{MF}/VMSTD) = 0.015432 \times (1068.6/41.8235) = \underline{.394291}\ \text{gr/DSCF}$$

5 Significant Digits Report
4 Significant Digits

D. Particulate loading at stack conditions, gr/ACF

$$AT = \frac{17.636 \times CAN \times PS \times MD}{(TS + 459.69)}$$

$$= \frac{17.636 \times .394291 \times 28.73 \times .90130}{(305.34 + 459.69)} = \underset{(.000001)\ \text{Report}\ (.0001)}{\underline{.235366}}\ \text{gr/ACF}$$

11. Particulate emission rate, lbs/hr.

CAW = 0.008571 x CAN x QS

= 0.008571 x .394291 x 280280 = 947.20 lbs/hr.
5 Significant Digits Report
3 Significant Digits

12. Particulate loading at standard conditons, lb/DSCF

C = CAN ÷ 7,000 = .394291 ÷ 7,000 = .000056327 lb/DSCF
5 Significant Digits Report
3 Significant Digits

13. Particulate emission rate, lb/MMBTU

$$E = C \times F \times \frac{20.9}{20.9 - \%O_2}$$

(F = DSCF/MMBTU, use 9820 for bituminous coal and O_2)

$$E = .000056327 \times 9820 \times \frac{20.9}{20.9 - 8.33}$$

E = .91969 lb/MMBTU
5 Significant Digits Report
3 Significant Digits

KENVIRONS, INC.

Bechtel Calculations and Results

Facility L6E – CR6 Date of run 7-22-90

Project Number 90019 Date of Calculation 7-22-90

Run Number BEC-ESP-B-6 Calculated By RCT

Name	Description	Units	Value
V1	Initial Meter Reading	dcf	65.700
V2	Final Meter Reading	dcf	108.817
VM	Dry gas volume, Meter condition	dcf	43.117
PB	Barometer pressure @ (Lab.)	in. Hg.	29.79
PBC	Barometer pressure corrected @ (console)	in. Hg.	29.74
PM	Average orifice pressure drop (ΔH)	in. Hg.	0.6126
Y	Dry gas meter calibration factor (curve)		1.035
TM	Average meter temperature	°F	98.74
(1) VMSTD	Dry gas volume, standard conditions	DSCF	41.98
VW	Total water collected	ml.	101.8
(2) PMOS	Percent moisture by volume	%	10.24
(3) MD	Mole fraction of dry gas	-	0.897
PCO2	Percent CO_2 by volume, dry	%	11.5
PO2	Percent O_2 by volume, dry	%	8.0
PCO	Percent CO by volume, dry	%	-0-
PN2	Percent N_2 by volume, dry	%	80.5
(4) MWD	Molecular weight, dry stack gas	-	30.16
(5) MW	Molecular weight, wet stack gas	-	28.92
DPS	Average stack gas velocity head (Avg. $\sqrt{\Delta P}$)	in. H_2O	0.52341
TS	Average stack temperature	°F	300.78
PS	Stack pressure, absolute	in. Hg.	28.67
(6) vs	Average stack gas velocity	fpm	2160
ID	Inside stack diameter	in.	—
AS	Stack area	sq. in.	33619
(7) QS	Stack flowrate, dry, standard conditions	DSCFM	301,000
TT	Net time of run	min.	100
DN	Nozzle diameter	in.	0.241
(8) PERI	Percent isokinetic	%	102.8
MF	Particulate weight, total	mg.	1788.2
(9) CAN	Particulate loading, standard conditions	gr/DSCF	.6574
(10) CAT	Particulate loading, stack conditions	gr/ACF	.3923
(11) CAW	Particulate emission rate	lb/hr	1700.
(12) C	Particulate concentration, standard conditions	lb/DSCF	.0000939
F	"F" factor	DSCF/MMBTU	9820
(13) E	Emission rate (lb per million BTU)	lb/MMBTU	1.49

. Volume of dry gas sampled at standard conditions (68°F, 29.921" Hg.), DSCF

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$$/MSTD = \frac{17.636 \times VM \times Y \left[PBC + \frac{PM}{13.6}\right]}{(TM + 459.69)} = \frac{17.636 \times 43.117 \times 1.035 \left[29.74 + \frac{0.6126}{13.6}\right]}{(98.74 + 459.69)} =$$

41.9777 DSCF
(.0001) Report (.01)

2. Volume of water vapor at standard conditions, SCF

$VWV = 0.04707 \times VW = 0.04707 \times 101.8 =$ 4.7917 SCF
(.0001) Report (.01)

Percent moisture in stack gas

$$PMOS = \frac{100 \times VWV}{VMSTD + VWV} = \frac{100 \times 4.7917}{41.9777 + 4.7917} =$$ 10.245 %

5 Significant Digits Report
3 Significant Digits

3. Mole fraction of dry gas

$$MD = 1 - \left(\frac{VWV}{VMSTD + VWV}\right) = 1 - \left[\frac{4.7917}{41.9777 + 4.7917}\right] =$$ 0.89754
(.00001) Report (.001)

4. Molecular weight of dry stack gas

$MWD = (\%CO_2 \times 0.440) + (\%O_2 \times 0.320) + (\%CO + \%N_2) \times 0.280$

$= (11.5 \times 0.440) + (9.0 \times 0.320) + (90.5 \times 0.280) =$ 30.16
(.0001) Report (.01

5. Molecular weight of wet stack gas

$MW = MWD \times MD + 18.015 (1 - MD) = 30.16 \times 0.89754 + 18.015 (1.00 - 0.89754) =$ 28.9156
(.0001) Report (.01

p6

6. Average stack gas velocity at stack conditons, fpm

$$s = 5129.4 \times Cp \times DPS \sqrt{\frac{TS + 459.69}{PS \times MW}}$$

$$= 5129.4 \times 0.94 \times 0.52341 \sqrt{\frac{300.78 + 459.69}{29.67 \times 28.9156}} = \underline{\quad 2159.97 \quad} \text{fpm}$$

(.1) Report (10)

Volumetric flowrate at standard conditions, DSCFM

$$S = \frac{0.12247 \times vs \times AS \times MD \times PS}{(TS + 459.69)}$$

$$= \frac{0.12247 \times 2159.97 \times 37619 \times 0.99754 \times 29.67}{(300.79 + 459.69)} = \underline{\quad 300{,}918.4 \quad} \text{DSCFM}$$

Five Significant Digits Report
3 Significant Digits

Percent isokinetic

$$ERI = \frac{1039.6 \times (TS + 459.69) \times VMSTD}{vs \times TT \times PS \times MD \times (DN)^2}$$

$$= \frac{1039.6 \times (300.79 + 459.69) \times 41.9777}{2159.97 \times 100 \times 29.67 \times 0.99754 \times (.241)^2} = \underline{\quad 102.80 \quad} \%$$

(.001) Report (.1)

Particulate loading at standard conditions, gr/DSCF

$$AN = 0.015432 \times ({}^{MF}/VMSTD) = 0.015432 \times (1788.2 \quad 141.9777) = \underline{\quad .657385 \quad} \text{gr/DSCF}$$

6 Significant Digits Report
4 Significant Digits

0. Particulate loading at stack conditions, gr/ACF

$$AT = \frac{17.636 \times CAN \times PS \times MD}{(TS + 459.69)}$$

$$= \frac{17.636 \times .657385 \times 29.67 \times .89754}{(300.78 + 459.69)} = \underline{\quad .392301 \quad} \text{gr/ACF}$$

(.000001) Report (.0001)

11. Particulate emission rate, lbs/hr.

CAW = 0.008571 x CAN x QS

= 0.008571 x .657385 x 300918.4 = 1695.5 lbs/hr.
5 Significant Digits Report
3 Significant Digits

12. Particulate loading at standard conditons, lb/DSCF

C = CAN ÷ 7,000 = .657385 ÷ 7,000 = .000093912 lb/DSCF
5 Significant Digits Report
3 Significant Digits

13. Particulate emission rate, lb/MMBTU

$$E = C \times F \times \frac{20.9}{20.9 - \%O_2}$$

F = DSCF/MMBTU, use 9820 for bituminous coal and O_2)

$$E = .000093912 \times 9820 \times \frac{20.9}{20.9 - 8.0}$$

= 1.4941 lb/MMBTU
5 Significant Digits Report
3 Significant Digits

KENVIRONS, INC.

Bechtel

Calculations and Results

Facility LGE-CR6
Date of run 7-23-80
Project Number 90019
Date of Calculation 7-23-80
Run Number AEC-ESP-B-7
Calculated By RJT

Name		Description	Units	Value
	V1	Initial Meter Reading	dcf	115.300
	V2	Final Meter Reading	dcf	155.000
	VM	Dry gas volume, Meter condition	dcf	39.700
	PB	Barometer pressure @ (Lab.)	in. Hg.	29.80
	PBC	Barometer pressure corrected @ (console)	in. Hg.	29.75
	PM	Average orifice pressure drop (ΔH)	in. Hg.	0.45
	Y	Dry gas meter calibration factor (curve)		1.032
	TM	Average meter temperature	°F	111.84
(1)	VMSTD	Dry gas volume, standard conditions	DSCF	37.65
	VW	Total water collected	ml.	80.8
(2)	PMOS	Percent moisture by volume	%	9.17
(3)	MD	Mole fraction of dry gas	-	0.90826
	PCO2	Percent CO_2 by volume, dry	%	11.50
	PO2	Percent O_2 by volume, dry	%	7.83
	PCO	Percent CO by volume, dry	%	-0-
	PN2	Percent N_2 by volume, dry	%	80.67
(4)	MWD	Molecular weight, dry stack gas	-	30.15
(5)	MW	Molecular weight, wet stack gas	-	29.04
	DPS	Average stack gas velocity head (Avg.$\sqrt{\Delta P}$)	in. H_2O	0.44909
	TS	Average stack temperature	°F	284.58
	PS	Stack pressure, absolute	in. Hg.	28.825
(6)	vs	Average stack gas velocity	fpm	1820
	ID	Inside stack diameter	in.	[illegible]
	AS	Stack area	sq. in.	23618
(7)	QS	Stack flowrate, dry, standard conditions	DSCFM	264,000
	TT	Net time of run	min.	100
	DN	Nozzle diameter	in.	0.241
(8)	PERI	Percent isokinetic	%	105.0
	MF	Particulate weight, total	mg.	921.7
(9)	CAN	Particulate loading, standard conditions	gr/DSCF	.3778
(10)	CAT	Particulate loading, stack conditions	gr/ACF	.2343
(11)	CAW	Particulate emission rate	lb/hr	856
(12)	C	Particulate concentration, standard conditions	lb/DSCF	.0000540
	F	"F" factor	DSCF/MMBTU	9820
(13)	E	Emission rate (lb per million BTU)	lb/MMBTU	.847

. Volume of dry gas sampled at standard conditions (68°F, 29.921" Hg.), DSCF

$$.MSTD = \frac{17.636 \times VM \times Y \left[PBC + \frac{PM}{13.6}\right]}{(TM + 459.69)} = \frac{17.636 \times 39.70 \times 1.032 \left[29.75 + \frac{0.45}{13.6}\right]}{(111.94 + 459.69)} =$$

37.6531 DSCF
(.0001) Report (.01)

2. Volume of water vapor at standard conditions, SCF

$$VWV = 0.04707 \times VW = 0.04707 \times 80.8 = 3.8033$$

(.0001) Report (.01) SCF

Percent moisture in stack gas

$$PMOS = \frac{100 \times VWV}{VMSTD + VWV} = \frac{100 \times 3.8033}{37.6531 + 3.8033} = 9.174 \%$$

5 Significant Digits Report
3 Significant Digits

3. Mole fraction of dry gas

$$MD = 1 - \left(\frac{VWV}{VMSTD + VWV}\right) = 1 - \left[\frac{3.8033}{37.6531 + 3.8033}\right] = 0.90826$$

(.00001) Report (.001)

4. Molecular weight of dry stack gas

$$MWD = (\%CO_2 \times 0.440) + (\%O_2 \times 0.320) + (\%CO + \%N_2) \times 0.280$$

$$= (11.50 \times 0.440) + (7.83 \times 0.320) + (80.67 \times 0.280) = 30.1532$$

(.0001) Report (.01

5. Molecular weight of wet stack gas

$$MW = MWD \times MD + 18.015\ (1 - MD) = 30.1532 \times 0.90826 + 18.015\ (1.00 - 0.90826) = 29.0396$$

(.0001) Report (.01

205

6. Average stack gas velocity at stack conditons, fpm

$$vs = 5129.4 \times Cp \times DPS \sqrt{\frac{TS + 459.69}{PS \times MW}}$$

$$= 5129.4 \times 0.84 \times 0.44909 \sqrt{\frac{284.58 + 459.69}{28.825 \times 29.0396}} = \underline{1824.587} \text{ fpm}$$

(.1) Report (10)

7. Volumetric flowrate at standard conditions, DSCFM

$$QS = \frac{0.12247 \times vs \times AS \times MD \times PS}{(TS + 459.69)}$$

$$= \frac{0.12247 \times 1824.587 \times 32618 \times 0.90826 \times 28.825}{(284.58 + 459.69)} = \underline{264{,}250.} \text{ DSCFM}$$

Five Significant Digits Report
3 Significant Digits

8. Percent isokinetic

$$PERI = \frac{1039.6 \times (TS + 459.69) \times VMSTD}{vs \times TT \times PS \times MD \times (DN)^2}$$

$$= \frac{1039.6 \times (284.58 + 459.69) \times 37.6531}{1824.587 \times 100 \times 28.825 \times 0.90826 \times (0.241)^2} = \underline{105.007} \text{ \%}$$

(:001) Report (.1)

9. Particulate loading at standard conditions, gr/DSCF

$$CAN = 0.015432 \times (MF/VMSTD) = 0.015432 \times (921.7 / 37.6531) = \underline{.377756} \text{ gr/DSCF}$$

5 Significant Digits Report
4 Significant Digits

10. Particulate loading at stack conditions, gr/ACF

$$CAT = \frac{17.636 \times CAN \times PS \times MD}{(TS + 459.69)}$$

$$= \frac{17.636 \times .377756 \times 28.825 \times .90826}{(284.58 + 459.69)} = \underline{.234348} \text{ gr/ACF}$$

(.000001) Report (.0001)

20'

11. Particulate emission rate, lbs/hr.

CAW = 0.008571 x CAN x QS

= 0.008571 x .377756 x 264250 = 855.57 lbs/hr.
5 Significant Digits Report
3 Significant Digits

12. Particulate loading at standard conditons, lb/DSCF

C = CAN ÷ 7,000 = .377756 ÷ 7,000 = .000053965 lb/DSCF
5 Significant Digits Report
3 Significant Digits

13. Particulate emission rate, lb/MMBTU

$$E = C \times F \times \frac{20.9}{20.9 - \%O_2}$$

'F = DSCF/MMBTU, use 9820 for bituminous coal and O_2)

$$E = .000053965 \times 9820 \times \frac{20.9}{20.9 - 7.83}$$

= .84741 lb/MMBTU
5 Significant Digits Report
3 Significant Digits

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KENVIRONS, INC.

Calculations and Results

Facility	BECHTEL LGE - CR6	**Date of run**	7/24/80
Project Number	80019	**Date of Calculation**	7/24/80
Run Number	BEC-ESP-B-8	**Calculated By**	J.J. BRALLEY

	Name	**Description**	**Units**	**Value**
	V1	Initial Meter Reading	dcf	161.000
	V2	Final Meter Reading	dcf	203.689
	VM	Dry gas volume, Meter condition	dcf	42.689
	PB	Barometer pressure @ (Lab.)	in. Hg.	29.82
	PBC	Barometer pressure corrected @ (console)	in. Hg.	29.77
	PM	Average orifice pressure drop (ΔH)	in. Hg.	0.4798
	Y	Dry gas meter calibration factor (curve)		1.0326
	TM	Average meter temperature	°F	107.91
(1)	VMSTD	Dry gas volume, standard conditions	DSCF	40.82
	VW	Total water collected	ml.	99.3
(2)	PMOS	Percent moisture by volume	%	10.3
(3)	MD	Mole fraction of dry gas	-	0.897
	PCO2	Percent CO_2 by volume, dry	%	11.5
	PO2	Percent O_2 by volume, dry	%	7.17 ?
	PCO	Percent CO by volume, dry	%	{ 81.33 }
	PN2	Percent N_2 by volume, dry	%	
(4)	MWD	Molecular weight, dry stack gas	-	30.13
(5)	MW	Molecular weight, wet stack gas	-	28.89
	DPS	Average stack gas velocity head (Avg.$\sqrt{\Delta P}$)	in. H_2O	0.51197
	TS	Average stack temperature	°F	294.86
	PS	Stack pressure, absolute	in. Hg.	28.65
(6)	vs	Average stack gas velocity	fpm	2110
	ID	Inside stack diameter	in.	78x431
	AS	Stack area	sq. in.	33618
(7)	QS	Stack flowrate, dry, standard conditions	DSCFM	295000
	TT	Net time of run	min.	100
	DN	Nozzle diameter	in.	0.241
(8)	PERI	Percent isokinetic	%	101.8
	MF	Particulate weight, total	mg.	805.6
(9)	CAN	Particulate loading, standard conditions	gr/DSCF	.3045
(10)	CAT	Particulate loading, stack conditions	gr/ACF	.1830
(11)	CAW	Particulate emission rate	lb/hr	771
(12)	C	Particulate concentration, standard conditions	lb/DSCF	.0000435
	F	"F" factor	DSCF/MMBTU	9820
(13)	E	Emission rate (lb per million BTU)	lb/MMBTU	.650

. Volume of dry gas sampled at standard conditions (68°F, 29.921" Hg.), DSCF 20

$$MSTD = \frac{17.636 \times VM \times Y \left[PBC + \frac{PM}{13.6}\right]}{(TM + 459.69)} = \frac{17.636 \times 42.689 \times 1.0326 \left[29.77 + \frac{0.4798}{13.6}\right]}{(107.91 + 459.69)} =$$

40.8224 DSCF
(.0001) Report (.01)

2. Volume of water vapor at standard conditions, SCF

$VWV = 0.04707 \times VW = 0.04707 \times 99.3 =$ 4.6741 SCF
(.0001) Report (.01)

Percent moisture in stack gas

$$PMOS = \frac{100 \times VWV}{VMSTD + VWV} = \frac{100 \times 4.6741}{40.8224 + 4.6741} =$$ 10.274 %

5 Significant Digits Report
3 Significant Digits

3. Mole fraction of dry gas

$$MD = 1 - \left(\frac{VWV}{VMSTD + VWV}\right) = 1 - \left[\frac{4.6741}{40.8224 + 4.6741}\right] =$$ 0.89726
(.00001) Report (.001)

4. Molecular weight of dry stack gas

$MWD = (\%CO_2 \times 0.440) + (\%O_2 \times 0.320) + (\%CO + \%N_2) \times 0.280$

= (11.5 x 0.440) + (7.17 ~~7.3~~ x 0.320) + (81.33 ~~81.2~~ x 0.280) = 30,1268 ~~30.1520~~
(.0001) Report (.01

5. Molecular weight of wet stack gas

MW = MWD x MD + 18.015 (1 - MD) = 30.1268 ~~30.1520~~ x 0.89726 + 18.015 (1.00 - 0.89726) = 28.8824 ~~28.8871~~
(.0001) Report (.01

6. Average stack gas velocity at stack conditons, fpm

$$s = 5129.4 \times Cp \times DPS \sqrt{\frac{TS + 459.69}{PS \times MW}}$$

$$= 5129.4 \times 0.84 \times 0.51197 \sqrt{\frac{294.86 + 459.69}{28.65 \times \overset{28.8824}{\cancel{28.8871}}}} = \overset{2106.5}{\cancel{2106.3}} \text{ fpm}$$

(.1) Report (10)

.. Volumetric flowrate at standard conditions, DSCFM

$$S = \frac{0.12247 \times vs \times AS \times MD \times PS}{(TS + 459.69)}$$

$$= \frac{0.12247 \times \overset{2106.5}{\cancel{2100.3}} \times 33618 \times 0.89726 \times 28.65}{(294.86 + 459.69)} = \overset{295480}{\cancel{295450}} \text{ DSCFM}$$

Five Significant Digits Report
3 Significant Digits

. Percent isokinetic

$$ERI = \frac{1039.6 \times (TS + 459.69) \times VMSTD}{vs \times TT \times PS \times MD \times (DN)^2}$$

$$\frac{1039.6 \times (294.86 + 459.69) \times 40.8224}{\underset{2106.5}{\cancel{2100.3}} \times 100 \times 28.65 \times 0.89726 \times (0.241)^2} = \overset{101.815}{\cancel{101.825}} \text{ \%}$$

(:001) Report (.1)

. Particulate loading at standard conditions, gr/DSCF

$$AN = 0.015432 \times (^{MF}/VMSTD) = 0.015432 \times (905.6 / 40.8224) = .304539 \text{ gr/DSCF}$$

5 Significant Digits Report
4 Significant Digits

0. Particulate loading at stack conditions, gr/ACF

$$AT = \frac{17.636 \times CAN \times PS \times MD}{(TS + 459.69)}$$

$$\frac{17.636 \times .304539 \times 28.65 \times .89726}{(294.86 + 459.69)} = .182978 \text{ gr/ACF}$$

(.000001) Report (.0001)

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11. Particulate emission rate, lbs/hr.

CAN = 0.008571 x CAN x QS

= 0.008571 x .304539 x 295480 = 771.26 lbs/hr.
5 Significant Digits Report
3 Significant Digits

12. Particulate loading at standard conditons, lb/DSCF

C = CAN ÷ 7,000 = .304539 ÷ 7,000 = .000043505 lb/DSCF
5 Significant Digits Report
3 Significant Digits

13. Particulate emission rate, lb/MMBTU

$$E = C \times F \times \frac{20.9}{20.9 - \%O_2}$$

'F = DSCF/MMBTU, use 9820 for bituminous coal and O_2)

$$F = .000043505 \times 9820 \times \frac{20.9}{20.9 - 7.17}$$

= .65032 lb/MMBTU
5 Significant Digits Report
3 Significant Digits

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KENVIRONS, INC.

Bechtel Calculations and Results

Facility LGE-CR6 Date of run 7-25-80

Project Number 90019 Date of Calculation 7-25-80

Run Number BEC-ESP-B-9 Calculated By RCT

Name	Description	Units	Value
V1	Initial Meter Reading	dcf	210.549
V2	Final Meter Reading	dcf	253.987
VM	Dry gas volume, Meter condition	dcf	43.438
PB	Barometer pressure @ (Lab.)	in. Hg.	29.84
PBC	Barometer pressure corrected @ (console)	in. Hg.	29.79
PM	Average orifice pressure drop (ΔH)	in. Hg.	0.5420
Y	Dry gas meter calibration factor (curve)		1.0338
TM	Average meter temperature	°F	113.63
(1) VMSTD	Dry gas volume, standard conditions	DSCF	41.21
VW	Total water collected	ml.	87.2
(2) PMOS	Percent moisture by volume	%	9.06
(3) MD	Mole fraction of dry gas	-	0.909
PCO2	Percent CO_2 by volume, dry	%	9.25
PO2	Percent O_2 by volume, dry	%	9.25
PCO	Percent CO by volume, dry	%	81.5
PN2	Percent N_2 by volume, dry	%	
(4) MWD	Molecular weight, dry stack gas	-	29.85
(5) MW	Molecular weight, wet stack gas	-	28.78
DPS	Average stack gas velocity head (Avg.$\sqrt{\Delta P}$)	in. H_2O	0.49209
TS	Average stack temperature	°F	294.80
PS	Stack pressure, absolute	in. Hg.	28.74
(6) vs	Average stack gas velocity	fpm	2030
ID	Inside stack diameter	in.	-
AS	Stack area	sq. in.	33618
(7) QS	Stack flowrate, dry, standard conditions	DSCFM	289000
TT	Net time of run	min.	100
DN	Nozzle diameter	in.	0.241
(8) PERI	Percent isokinetic	%	105.1
MF	Particulate weight, total	mg.	1242.0
(9) CAN	Particulate loading, standard conditions	gr/DSCF	.4651
(10) CAT	Particulate loading, stack conditions	gr/ACF	.2842
(11) CAW	Particulate emission rate	lb/hr	1150
(12) C	Particulate concentration, standard conditions	lb/DSCF	.0000664
F	"F" factor	DSCF/MMBTU	9820
(13) E	Emission rate (lb per million BTU)	lb/MMBTU	1.17

. Volume of dry gas sampled at standard conditions (68°F, 29.921" Hg.), DSCF 20

$$VMSTD = \frac{17.636 \times VM \times Y \left[PBC + \frac{PM}{13.6}\right]}{(TM + 459.69)} = \frac{17.636 \times 43.438 \times 1.0338 \left[29.79 + \frac{0.5420}{13.6}\right]}{(113.63 + 459.69)} =$$

41.2060 DSCF
(.0001) Report (.01)

2. Volume of water vapor at standard conditions, SCF

$VWV = 0.04707 \times VW = 0.04707 \times 87.2 =$ 4.1045 SCF
(.0001) Report (.01)

Percent moisture in stack gas

$$PMOS = \frac{100 \times VWV}{VMSTD + VWV} = \frac{100 \times 4.1045}{41.2060 + 4.1045} = 9.0586 \%$$

5 Significant Digits Report
3 Significant Digits

3. Mole fraction of dry gas

$$MD = 1 - \left(\frac{VWV}{VMSTD + VWV}\right) = 1 - \left[\frac{4.1045}{41.2060 + 4.1045}\right] = 0.90941$$

(.00001) Report (.001)

4. Molecular weight of dry stack gas

$MWD = (\%CO_2 \times 0.440) + (\%O_2 \times 0.320) + (\%CO + \%N_2) \times 0.280$

$= (9.25 \times 0.440) + (9.25 \times 0.320) + (81.5 \times 0.280) = 29.8500$
(.0001) Report
(.01

5. Molecular weight of wet stack gas

$MW = MWD \times MD + 18.015 (1 - MD) = 29.8500 \times 0.90941 + 18.015 (1.00 - 0.90941) = 28.7779$
(.0001) Report
(.01

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6. Average stack gas velocity at stack conditons, fpm

$$\text{'s} = 5129.4 \times Cp \times DPS \sqrt{\frac{TS + 459.69}{PS \times MW}}$$

$$= 5129.4 \times 0.84 \times 0.49209 \sqrt{\frac{294.80 + 459.69}{28.74 \times 28.78}} = \underset{(.1)\ \text{Report}\ (10)}{\underline{2025.0}}\ \text{fpm}$$

. Volumetric flowrate at standard conditions, DSCFM

$$\text{)S} = \frac{0.12247 \times vs \times AS \times MD \times PS}{(TS + 459.69)}$$

$$= \frac{0.12247 \times 2025.0 \times 33618 \times 0.90941 \times 28.74}{(294.80 + 459.69)} = \underline{288810}\ \text{DSCFM}$$

Five Significant Digits Report
3 Significant Digits

. Percent isokinetic

$$PERI = \frac{1039.6 \times (TS + 459.69) \times VMSTD}{vs \times TT \times PS \times MD \times (DN)^2}$$

$$= \frac{1039.6 \times (294.00 + 459.69) \times 41.2060}{2025.0 \times 100 \times 28.74 \times 0.90941 \times (0.241)^2} = \underset{(.001)\ \text{Report}\ (.1)}{\underline{105.142}}\ \%$$

. Particulate loading at standard conditions, gr/DSCF

$$\text{:AN} = 0.015432 \times (MF/VMSTD) = 0.015432 \times (1242.0 / 41.2060) = \underline{.465140}\ \text{gr/DSCF}$$

6 Significant Digits Report
4 Significant Digits

10. Particulate loading at stack conditions, gr/ACF

$$\text{:AT} = \frac{17.636 \times CAN \times PS \times MD}{(TS + 459.69)}$$

$$= \frac{17.636 \times .465140 \times 28.74 \times .90941}{(294.80 + 459.69)} = \underset{(.000001)\ \text{Report}\ (.0001)}{\underline{.284169}}\ \text{gr/ACF}$$

11. Particulate emission rate, lbs/hr.

CAW = 0.008571 x CAN x QS

= 0.008571 x .465140 x 288810 = 1151.4 lbs/hr.
5 Significant Digits Report
3 Significant Digits

12. Particulate loading at standard conditons, lb/DSCF

C = CAN ÷ 7,000 = .465140 ÷ 7,000 = .000066448 lb/DSCF
5 Significant Digits Report
3 Significant Digits

13. Particulate emission rate, lb/MMBTU

$$E = C \times F \times \frac{20.9}{20.9 - \%O_2}$$

(F = DSCF/MMBTU, use 9820 for bituminous coal and O_2)

$$E = .000066448 \times 9820 \times \frac{20.9}{20.9 - 9.25}$$

E = 1.1706 lb/MMBTU
5 Significant Digits Report
3 Significant Digits

KENVIRONS, INC.

Bechtel Calculations and Results

Facility LGE - CR6 Date of run 7-26-80

Project Number 80019 Date of Calculation 7-26-80

Run Number BEC - ESP-B-10 Calculated By RCT

Name	**Description**	**Units**	**Value**
V1	Initial Meter Reading	dcf	260.100
V2	Final Meter Reading	dcf	301.632
VM	Dry gas volume, Meter condition	dcf	41.532
PB	Barometer pressure @ (Lab.)	in. Hg.	29.78
PBC	Barometer pressure corrected @ (console)	in. Hg.	29.73
PM	Average orifice pressure drop (ΔH)	in. Hg.	0.5504
Y	Dry gas meter calibration factor (curve)		1.034
TM	Average meter temperature	°F	108.26
(1) VMSTD	Dry gas volume, standard conditions	DSCF	39.70
VW	Total water collected	ml.	86.5
(2) PMOS	Percent moisture by volume	%	9.30
(3) MD	Mole fraction of dry gas	-	0.907
PCO2	Percent CO_2 by volume, dry	%	12.75
PO2	Percent O_2 by volume, dry	%	7.25
PCO	Percent CO by volume, dry	%	-
PN2	Percent N_2 by volume, dry	%	80.00
(4) MWD	Molecular weight, dry stack gas	-	30.33
(5) MW	Molecular weight, wet stack gas	-	29.184
DPS	Average stack gas velocity head (Avg.$\sqrt{\Delta P}$)	in. H_2O	0.498900
TS	Average stack temperature	°F	291.9
PS	Stack pressure, absolute	in. Hg.	28.64
(6) vs	Average stack gas velocity	fpm	2040
ID	Inside stack diameter	in.	-
AS	Stack area	sq. in.	33618
(7) QS	Stack flowrate, dry, standard conditions	DSCFM	290,000
TT	Net time of run	min.	100
DN	Nozzle diameter	in.	0.241
(8) PERI	Percent isokinetic	%	100.9634
MF	Particulate weight, total	mg.	710.2
(9) CAN	Particulate loading, standard conditions	gr/DSCF	.2761
(10) CAT	Particulate loading, stack conditions	gr/ACF	.1683
(11) CAW	Particulate emission rate	lb/hr	686
(12) C	Particulate concentration, standard conditions	lb/DSCF	.0000394
F	"F" factor	DSCF/MMBTU	9820
(13) E	Emission rate (lb per million BTU)	lb/MMBTU	.593

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. Volume of dry gas sampled at standard conditions (68°F, 29.921" Hg.), DSCF

$$.MSTD = \frac{17.636 \times VM \times Y \left[PBC + \frac{PM}{13.6}\right]}{(TM + 459.69)} = \frac{17.636 \times 41.532 \times 1.034 \left[29.73 + \frac{0.55}{13.6}\right]}{(108.26 + 459.69)} =$$

39.6989 DSCF
(.0001) Report (.01)

?. Volume of water vapor at standard conditions, SCF

$VWV = 0.04707 \times VW = 0.04707 \times 86.5 =$ 4.07155 SCF
(.0001) Report (.01)

Percent moisture in stack gas

$$PMOS = \frac{100 \times VWV}{VMSTD + VWV} = \frac{100 \times 4.07155}{39.6999 + 4.07155} = 9.302\ \%$$

5 Significant Digits Report
3 Significant Digits

:. Mole fraction of dry gas

$$MD = 1 - \left(\frac{VWV}{VMSTD + VWV}\right) = 1 - \left[\frac{4.07155}{39.6989 + 4.07155}\right] = 0.90699$$

(.00001) Report (.001)

4. Molecular weight of dry stack gas

$MWD = (\%CO_2 \times 0.440) + (\%O_2 \times 0.320) + (\%CO + \%N_2) \times 0.280$

$= (12.75 \times 0.440) + (7.25 \times 0.320) + (80 \times 0.280) =$ 30.33
(.0001) Report (.01)

5. Molecular weight of wet stack gas

$MW = MWD \times MD + 18.015\ (1 - MD) = 30.33 \times 0.90698 + 18.015\ (1.00 - 0.90698) =$ 29.1844
(.0001) Report (.01)

2^2

11. Particulate emission rate, lbs/hr.

CAW = 0.008571 x CAN x QS

= 0.008571 x .276073 x 290053.52 = 686.33 ______ lbs/hr.
5 Significant Digits Report
3 Significant Digits

12. Particulate loading at standard conditons, lb/DSCF

C = CAN ÷ 7,000 = .276073 ÷ 7,000 = .000039439 lb/DSCF
5 Significant Digits Report
3 Significant Digits

13. Particulate emission rate, lb/MMBTU

$$E = C \times F \times \frac{20.9}{20.9 - \%O_2}$$

(F = DSCF/MMBTU, use 9820 for bituminous coal and O_2)

$$E = .000039439 \times 9820 \times \frac{20.9}{20.9 - 7.25}$$

E = .59299 lb/MMBTU
5 Significant Digits Report
3 Significant Digits

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KENVIRONS, INC.

Calculations and Results

Facility Bechtel LGE - CR6 Date of run 7-17-80

Project Number 90019 Date of Calculation 7-18-80

Run Number BEC-STK-1 Calculated By RCT

Name	Description	Units	Value
V1	Initial Meter Reading	dcf	418.664
V2	Final Meter Reading	dcf	454.843
VM	Dry gas volume, Meter condition	dcf	36.179
PB	Barometer pressure @ (Lab.)	in. Hg.	29.66
PBC	Barometer pressure corrected @ (console)	in. Hg.	29.41
PM	Average orifice pressure drop (ΔH)	in. Hg.	0.532
Y	Dry gas meter calibration factor (curve)		1.017
TM	Average meter temperature	°F	114
(1) VMSTD	Dry gas volume, standard conditions	DSCF	33.34
VW	Total water collected	ml.	68.1
(2) PMOS	Percent moisture by volume	%	8.77
(3) MD	Mole fraction of dry gas	-	0.912
PCO2	Percent CO_2 by volume, dry	%	10.4
PO2	Percent O_2 by volume, dry	%	8.5
PCO	Percent CO by volume, dry	%	0.2
PN2	Percent N_2 by volume, dry	%	90.6
(4) MWD	Molecular weight, dry stack gas	-	30.02
(5) MW	Molecular weight, wet stack gas	-	28.96
DPS	Average stack gas velocity head (Avg. $\sqrt{\Delta P}$)	in. H_2O	0.51365
TS	Average stack temperature	°F	169.18
PS	Stack pressure, absolute	in. Hg.	29.384
(6) vs	Average stack gas velocity	fpm	3120
ID	Inside stack diameter	in.	228
AS	Stack area	sq. in.	40828.1
(7) QS	Stack flowrate, dry, standard conditions	DSCFM	666,000
TT	Net time of run	min.	84
DN	Nozzle diameter	in.	0.172
(8) PERI	Percent isokinetic	%	104.7
MF	Particulate weight, total	mg.	79.8
(9) CAN	Particulate loading, standard conditions	gr/DSCF	.0369
(10) CAT	Particulate loading, stack conditions	gr/ACF	.0279
(11) CAW	Particulate emission rate	lb/hr	211
(12) C	Particulate concentration, standard conditions	lb/DSCF	.00000528
F	"F" factor	DSCF/MMBTU	9820
(13) E	Emission rate (lb per million BTU)	lb/MMBTU	.0895

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1. Volume of dry gas sampled at standard conditions (68°F, 29.921" Hg.), DSCF

$$\text{VMSTD} = \frac{17.636 \times \text{VM} \times \text{Y}\left[\text{PBC} + \frac{\text{PM}}{13.6}\right]}{(\text{TM} + 459.69)} = \frac{17.636 \times 36.579 \times 1.017 \left[29.114 + \frac{0.532}{13.6}\right]}{(114 + 459.69)} =$$

33.3438 DSCF
(.0001) Report (.01)

2. Volume of water vapor at standard conditions, SCF

$$\text{VWV} = 0.04707 \times \text{VW} = 0.04707 \times 68.1 = 3.2055 \text{ SCF}$$

(.0001) Report (.01)

Percent moisture in stack gas

$$\text{PMOS} = \frac{100 \times \text{VWV}}{\text{VMSTD} + \text{VWV}} = \frac{100 \times 3.2055}{33.3438 + 3.2055} = 5.7703 \,\%$$

5 Significant Digits Report
3 Significant Digits

3. Mole fraction of dry gas

$$\text{MD} = 1 - \left(\frac{\text{VWV}}{\text{VMSTD} + \text{VWV}}\right) = 1 - \left[\frac{3.2055}{33.3438 + 3.2055}\right] = 0.91230$$

(.00001) Report (.001)

4. Molecular weight of dry stack gas

$$\text{MWD} = (\%\text{CO}_2 \times 0.440) + (\%\text{O}_2 \times 0.320) + (\%\text{CO} + \%\text{N}_2) \times 0.280$$

$$= (10.4 \times 0.440) + (9.5 \times 0.320) + (80.9 \times 0.280) = 30.016$$

(.0001) Report
(.0

5. Molecular weight of wet stack gas

$$\text{MW} = \text{MWD} \times \text{MD} + 18.015\,(1 - \text{MD}) = 30.016 \times 0.91230 + 18.015\,(1.00 - 0.91230) = 25.9635$$

(.0001) Report
(.0

6. Average stack gas velocity at stack conditons, fpm

$$vs = 5129.4 \times Cp \times DPS \sqrt{\frac{TS + 459.69}{PS \times MW}}$$

$$= 5129.4 \times 0.84 \times 0.84368 \sqrt{\frac{169.18 + 459.69}{29.384 \times 25.9635}} = 3124.8 \text{ fpm}$$

(.1) Report (10)

7. Volumetric flowrate at standard conditions, DSCFM

$$QS = \frac{0.12247 \times vs \times AS \times MD \times PS}{(TS + 459.69)}$$

$$= \frac{0.12247 \times 3124.8 \times 40828.1 \times 0.9123 \times 29.384}{(169.18 + 459.69)} = 666037 \text{ DSCF}$$

Five Significant Digits Report
3 Significant Digits

8. Percent isokinetic

$$PERI = \frac{1039.6 \times (TS + 459.69) \times VMSTD}{vs \times TT \times PS \times MD \times (DN)^2}$$

$$= \frac{1039.6 \times (169.18 + 459.69) \times 33.3438}{3124.8 \times 84 \times 29.384 \times 0.9123 \times (0.172)^2} = 104.721\ \%$$

(.001) Report (.1)

9. Particulate loading at standard conditions, gr/DSCF

$$CAN = 0.015432 \times (^{MF}/VMSTD) = 0.015432 \times (79.8 / 33.3438) = .0369326 \text{ gr/DSCF}$$

6 Significant Digits Report
4 Significant Digits

10. Particulate loading at stack conditions, gr/ACF

$$CAT = \frac{17.636 \times CAN \times PS \times MD}{(TS + 459.69)}$$

$$= \frac{17.636 \times .0369326 \times 29.384 \times .91230}{(169.18 + 459.69)} = .02776500 \text{ gr/ACF}$$

(.000001) Report (.0001)

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11. Particulate emission rate, lbs/hr.

CAW = 0.008571 x CAN x QS

= 0.008571 x .0369326 x 666037 = 210.83 lbs/hr.
5 Significant Digits Report
3 Significant Digits

12. Particulate loading at standard conditons, lb/DSCF

C = CAN ÷ 7,000 = .0369326 ÷ 7,000 = .000005276 lb/DSCF
5 Significant Digits Report
3 Significant Digits

13. Particulate emission rate, lb/MMBTU

$$E = C \times F \times \frac{20.9}{20.9 - \%O_2}$$

(F = DSCF/MMBTU, use 9820 for bituminous coal and O_2)

$$E = .000005276 \times 9820 \times \frac{20.9}{20.9 - 8.8}$$

E = .089491 lb/MMBTU
5 Significant Digits Report
3 Significant Digits

KENVIRONS, INC.

Calculations and Results

Facility Bechtel LGE - CTG **Date of run** 7-18-80

Project Number 80019 **Date of Calculation** 7-18-80

Run Number AEC-STK-2 **Calculated By** RCT

Name	**Description**	**Units**	**Value**
V1	Initial Meter Reading	dcf	463.025
V2	Final Meter Reading	dcf	500.850
VM	Dry gas volume, Meter condition	dcf	37.825
PB	Barometer pressure @ (Lab.)	in. Hg.	29.50
PBC	Barometer pressure corrected @ (console)	in. Hg.	29.58
PM	Average orifice pressure drop (ΔH)	in. Hg.	0.577
Y	Dry gas meter calibration factor (curve)		1.0175
TM	Average meter temperature	°F	112.41
(1) VMSTD	Dry gas volume, standard conditions	DSCF	35.1449
VW	Total water collected	ml.	131.5
(2) PMOS	Percent moisture by volume	%	14.97
(3) MD	Mole fraction of dry gas	-	0.850
PCO2	Percent CO_2 by volume, dry	%	10.8
PO2	Percent O_2 by volume, dry	%	8.35
PCO	Percent CO by volume, dry	%	-0-
PN2	Percent N_2 by volume, dry	%	80.85
(4) MWD	Molecular weight, dry stack gas	-	30.06
(5) MW	Molecular weight, wet stack gas	-	28.26
DPS	Average stack gas velocity head (Avg.$\sqrt{\Delta P}$)	in. H_2O	0.8866
TS	Average stack temperature	°F	174.96
PS	Stack pressure, absolute	in. Hg.	29.52
(6) vs	Average stack gas velocity	fpm	3330.0
ID	Inside stack diameter	in.	228
AS	Stack area	sq. in.	40828.1
(7) QS	Stack flowrate, dry, standard conditions	DSCFM	659,000
TT	Net time of run	min.	54
DN	Nozzle diameter	in.	0.172
(8) PERI	Percent isokinetic	%	111.573
MF	Particulate weight, total	mg.	90.9
(9) CAN	Particulate loading, standard conditions	gr/DSCF	.0399
(10) CAT	Particulate loading, stack conditions	gr/ACF	.0278
(11) CAW	Particulate emission rate	lb/hr	225
(12) C	Particulate concentration, standard conditions	lb/DSCF	.00000570
F	"F" factor	DSCF/MMBTU	9820
(13) E	Emission rate (lb per million BTU)	lb/MMBTU	.0932

1. **Volume of dry gas sampled at standard conditions (68°F, 29.921" Hg.), DSCF**

[illegible]

$$VMSTD = \frac{17.636 \times VM \times Y \left[PBC + \frac{PM}{13.6}\right]}{(TM + 459.69)} = \frac{17.636 \times 30.535 \times 1.0175 \left[29.55 + \frac{0.5[illegible]}{13.6}\right]}{(113.[illegible] + 459.69)} =$$

35.1449 DSCF
(.0001) Report (.01)

2. **Volume of water vapor at standard conditions, SCF**

$VWV = 0.04707 \times VW = 0.04707 \times 131.5 =$ 6.1897 SCF
(.0001) Report (.01)

Percent moisture in stack gas

$$PMOS = \frac{100 \times VWV}{VMSTD + VWV} = \frac{100 \times 6.1897}{35.1449 + 6.1897} =$$

14.97 %
5 Significant Digits Report
3 Significant Digits

3. **Mole fraction of dry gas**

$$MD = 1 - \left(\frac{VWV}{VMSTD + VWV}\right) = 1 - \left[\frac{6.1897}{35.1449 + 6.1897}\right] =$$

0.85025
(.00001) Report (.001)

4. **Molecular weight of dry stack gas**

$MWD = (\%CO_2 \times 0.440) + (\%O_2 \times 0.320) + (\%CO + \%N_2) \times 0.280$

$= (10.5 \times 0.440) + (8.35 \times 0.320) + (80.55 \times 0.280) =$ 30.0620
(.0001) Report
(.01

5. **Molecular weight of wet stack gas**

$MW = MWD \times MD + 18.015\,(1 - MD) = 30.0620 \times 0.85025 + 18.015\,(1.00 - 0.85025) =$ 28.2580
(.0001) Report
(.01

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6. Average stack gas velocity at stack conditons, fpm

$$vs = 5129.4 \times Cp \times DPS \sqrt{\frac{TS + 459.69}{PS \times MW}}$$

$$= 5129.4 \times 0.84 \times 0.8566 \sqrt{\frac{174.96 + 459.69}{29.52 \times 28.255}} = \underset{(.1)\ \text{Report}\ (10)}{\underline{3332.0\ ✓}}\ \text{fp}$$

7. Volumetric flowrate at standard conditions, DSCFM

$$QS = \frac{0.12247 \times vs \times AS \times MD \times PS}{(TS + 459.69)}$$

$$= \frac{0.12247 \times 3332.0 \times 40528.1 \times 0.85025 \times 29.52}{(174.96 + 459.69)} = \underset{\text{Five Significant Digits Report 3 Significant Digits}}{\underline{658900\ ✓}}\ \text{DSCI}$$

8. Percent isokinetic

$$PERI = \frac{1039.6 \times (TS + 459.69) \times VMSTD}{vs \times TT \times PS \times MD \times (DN)^2}$$

$$= \frac{1039.6 \times (174.96 + 459.69) \times 35.1449}{3332.0 \times 84 \times 29.52 \times 0.85025 \times (0.172)^2} = \underset{(.001)\ \text{Report}\ (.1)}{\underline{111.573\ ✓}}$$

9. Particulate loading at standard conditions, gr/DSCF

$$CAN = 0.015432 \times (MF/VMSTD) = 0.015432 \times (90.9 / 35.1449) = \underset{\text{5 Significant Digits Report 4 Significant Digits}}{\underline{.0399139}}\ \text{gr/DSCF}$$

10. Particulate loading at stack conditions, gr/ACF

$$CAT = \frac{17.636 \times CAN \times PS \times MD}{(TS + 459.69)}$$

$$= \frac{17.636 \times .0399139 \times 29.52 \times .85025}{(174.96 + 459.69)} = \underset{(.000001)\ \text{Report}\ (.0001)}{\underline{.0278390}}\ \text{gr/ACF}$$

11. Particulate emission rate, lbs/hr.

CAW = 0.008571 x CAN x QS

= 0.008571 x .0399139 x 658900 = 225.41 lbs/hr.
5 Significant Digits Report
3 Significant Digits

12. Particulate loading at standard conditons, lb/DSCF

C = CAN ÷ 7,000 = .0399139 ÷ 7,000 = .000005701 lb/DSCF
5 Significant Digits Report
3 Significant Digits

13. Particulate emission rate, lb/MMBTU

$$E = C \times F \times \frac{20.9}{20.9 - \%O_2}$$

(F = DSCF/MMBTU, use 9820 for bituminous coal and O_2)

$$E = .000005701 \times 9820 \times \frac{20.9}{20.9 - 8.35}$$

E = .093232 lb/MMBTU
5 Significant Digits Report
3 Significant Digits

KENVIRONS, INC.

Bechtel
Calculations and Results

Facility LGE - CR6
Date of run 7-19-90
Project Number 80019
Date of Calculation 7-19-80
Run Number BEC-STK-3
Calculated By RJ

	Name	Description	Units	Value
	V1	Initial Meter Reading	dcf	508.662
	V2	Final Meter Reading	dcf	543.428
	VM	Dry gas volume, Meter condition	dcf	34.766
	PB	Barometer pressure @ (Lab.)	in. Hg.	29.86
	PBC	Barometer pressure corrected @ (console)	in. Hg.	29.64
	PM	Average orifice pressure drop (ΔH)	in. ~~Hg.~~ H_2O	0.487
	Y	Dry gas meter calibration factor (curve)		1.0158
	TM	Average meter temperature	°F	112.16
(1)	VMSTD	Dry gas volume, standard conditions	DSCF	32.3209
	VW	Total water collected	ml.	113.0
(2)	PMOS	Percent moisture by volume	%	14.13
(3)	MD	Mole fraction of dry gas	-	0.8587
	PCO2	Percent CO_2 by volume, dry	%	10.4
	PO2	Percent O_2 by volume, dry	%	8.7
	PCO	Percent CO by volume, dry	%	-0-
	PN2	Percent N_2 by volume, dry	%	80.9
(4)	MWD	Molecular weight, dry stack gas	-	30.012
(5)	MW	Molecular weight, wet stack gas	-	28.32
	DPS	Average stack gas velocity head (Avg.$\sqrt{\Delta P}$)	in. H_2O	0.85424
	TS	Average stack temperature	°F	175.82
	PS	Stack pressure, absolute	in. Hg.	29.58
(6)	vs	Average stack gas velocity	fpm	3210
	ID	Inside stack diameter	in.	228
	AS	Stack area	sq. in.	40828.1
(7)	QS	Stack flowrate, dry, standard conditions	DSCFM	641,000
	TT	Net time of run	min.	84
	DN	Nozzle diameter	in.	0.172
(8)	PERI	Percent isokinetic	%	105.52
	MF	Particulate weight, total	mg.	96.7
(9)	CAN	Particulate loading, standard conditions	gr/DSCF	.0462
(10)	CAT	Particulate loading, stack conditions	gr/ACF	.0325
(11)	CAW	Particulate emission rate	lb/hr	254
(12)	C	Particulate concentration, standard conditions	lb/DSCF	.00000660
	F	"F" factor	DSCF/MMBTU	9820
(13)	E	Emission rate (lb per million BTU)	lb/MMBTU	.111

1. Volume of dry gas sampled at standard conditions (68°F, 29.921" Hg.), DSCF

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$$VMSTD = \frac{17.636 \times VM \times Y \left[PBC + \frac{PM}{13.6}\right]}{(TM + 459.69)} = \frac{17.636 \times 34.766 \times 1.0158 \left[29.64 + \frac{0.487}{13.6}\right]}{(112.16 + 459.69)} =$$

32.3209 DSCF
(.0001) Report (.01)

2. Volume of water vapor at standard conditions, SCF

$$VWV = 0.04707 \times VW = 0.04707 \times 113.00 = 5.3189$$

(.0001) Report (.01) SCF

Percent moisture in stack gas

$$PMOS = \frac{100 \times VWV}{VMSTD + VWV} = \frac{100 \times 5.3189}{32.3209 + 5.3189} = 14.131\ \%$$

5 Significant Digits Report
3 Significant Digits

3. Mole fraction of dry gas

$$MD = 1 - \left(\frac{VWV}{VMSTD + VWV}\right) = 1 - \left[\frac{5.3189}{32.3209 + 5.3189}\right] = 0.85869$$

(.00001) Report (.001)

4. Molecular weight of dry stack gas

$$MWD = (\%CO_2 \times 0.440) + (\%O_2 \times 0.320) + (\%CO + \%N_2) \times 0.280$$

$$= (10.4 \times 0.440) + (8.7 \times 0.320) + (80.9 \times 0.280) = 30.0120$$

(.0001) Report
(.0

5. Molecular weight of wet stack gas

$$MW = MWD \times MD + 18.015\,(1 - MD) = 30.012 \times 0.85869 + 18.015\,(1.00 - 0.85869) = 28.3167$$

(.0001) Report
(.0

6. Average stack gas velocity at stack conditons, fpm

$$vs = 5129.4 \times Cp \times DPS \sqrt{\frac{TS + 459.69}{PS \times MW}}$$

$$= 5129.4 \times 0.84 \times 0.85424 \sqrt{\frac{175.82 + 459.69}{29.58 \times 28.3167}} = \underset{\text{(.1) Report (10)}}{\underline{3206.02}} \text{ fp}$$

7. Volumetric flowrate at standard conditions, DSCFM

$$QS = \frac{0.12247 \times vs \times AS \times MD \times PS}{(TS + 459.69)}$$

$$= \frac{0.12247 \times 3206.02 \times 40828.1 \times 0.85869 \times 29.58}{(175.82 + 459.69)} = \underset{\text{Five Significant Digits Report 3 Significant Digits}}{\underline{640,719.5}} \text{ DSC}$$

8. Percent isokinetic

$$PERI = \frac{1039.6 \times (TS + 459.69) \times VMSTD}{vs \times TT \times PS \times MD \times (DN)^2}$$

$$= \frac{1039.6 \times (175.82 + 459.69) \times 32.3209}{3206.02 \times 84 \times 29.58 \times 0.85869 \times (0.172)^2} = \underset{\text{(.001) Report (.1)}}{\underline{105.52}}$$

9. Particulate loading at standard conditions, gr/DSCF

$$CAN = 0.015432 \times (^{MF}/VMSTD) = 0.015432 \times (96.7 / 32.3209) = \underset{\text{5 Significant Digits Report 4 Significant Digits}}{\underline{.0461706}} \text{ gr/DSCF}$$

10. Particulate loading at stack conditions, gr/ACF

$$CAT = \frac{17.636 \times CAN \times PS \times MD}{(TS + 459.69)}$$

$$= \frac{17.636 \times .0461706 \times 29.58 \times .85869}{(175.82 + 459.69)} = \underset{\text{(.000001) Report (.0001)}}{\underline{.0325445}} \text{ gr/ACF}$$

11. Particulate emission rate, lbs/hr.

CAW = 0.008571 x CAN x QS

= 0.008571 x .0461706 x 640718.5 = 253.55 lbs/hr.
5 Significant Digits Report
3 Significant Digits

12. Particulate loading at standard conditons, lb/DSCF

C = CAN ÷ 7,000 = .0461706 ÷ 7,000 = .000006595 lb/DSCF
5 Significant Digits Report
3 Significant Digits

13. Particulate emission rate, lb/MMBTU

$$E = C \times F \times \frac{20.9}{20.9 - \%O_2}$$

(F = DSCF/MMBTU, use 9820 for bituminous coal and O_2)

$$E = .000006595 \times 9820 \times \frac{20.9}{20.9 - 8.7}$$

E = .11095 lb/MMBTU
5 Significant Digits Report
3 Significant Digits

KENVIRONS, INC.

Bechtel Calculations and Results

Facility LGE - CR6
Date of run 7-20-80
Project Number 80019
Date of Calculation 7-20-80
Run Number BEC- STK-4
Calculated By RCJ

	Name	Description	Units	Value
	V1	Initial Meter Reading	dcf	550,098
	V2	Final Meter Reading	dcf	584.587
	VM	Dry gas volume, Meter condition	dcf	34.489
	PB	Barometer pressure @ (Lab.)	in. Hg.	29.85
	PBC	Barometer pressure corrected @ (console)	in. Hg.	29.63
	PM	Average orifice pressure drop (ΔH)	in. Hg.	0.47786
	Y	Dry gas meter calibration factor (curve)		1.0155
	TM	Average meter temperature	°F	119.589
(1)	VMSTD	Dry gas volume, standard conditions	DSCF	31.69
	VW	Total water collected	ml.	115.7
(2)	PMOS	Percent moisture by volume	%	14.7
(3)	MD	Mole fraction of dry gas	-	0.853
	PCO2	Percent CO_2 by volume, dry	%	10.8
	PO2	Percent O_2 by volume, dry	%	8.2
	PCO	Percent CO by volume, dry	%	0.0
	PN2	Percent N_2 by volume, dry	%	81.0
(4)	MWD	Molecular weight, dry stack gas	-	30.06
(5)	MW	Molecular weight, wet stack gas	-	28.29
	DPS	Average stack gas velocity head (Avg.$\sqrt{\Delta P}$)	in. H_2O	0.85507
	TS	Average stack temperature	°F	179.178
	PS	Stack pressure, absolute	in. Hg.	29.57
(6)	vs	Average stack gas velocity	fpm	3220
	ID	Inside stack diameter	in.	228
	AS	Stack area	sq. in.	40828.1
(7)	QS	Stack flowrate, dry, standard conditions	DSCFM	636,000
	TT	Net time of run	min.	84
	DN	Nozzle diameter	in.	0.172
(8)	PERI	Percent isokinetic	%	104.2
	MF	Particulate weight, total	mg.	91.2
(9)	CAN	Particulate loading, standard conditions	gr/DSCF	.0444
(10)	CAT	Particulate loading, stack conditions	gr/ACF	.0309
(11)	CAW	Particulate emission rate	lb/hr	242
(12)	C	Particulate concentration, standard conditions	lb/DSCF	.00000654
	F	"F" factor	DSCF/MMBTU	9820
(13)	E	Emission rate (lb per million BTU)	lb/MMBTU	.103

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1. **Volume of dry gas sampled at standard conditions (68°F, 29.921" Hg.), DSCF**

$$VMSTD = \frac{17.636 \times VM \times Y \left[PBC + \frac{PM}{13.6}\right]}{(TM + 459.69)} = \frac{17.636 \times 34.489 \times 1.0155 \left[29.6 + \frac{0.47786}{13.6}\right]}{(118.509 + 459.69)} =$$

31.6862 DSCF
(.0001) Report (.01)

2. **Volume of water vapor at standard conditions, SCF**

$VWV = 0.04707 \times VW = 0.04707 \times 115.7$ = 5.4460 SCF
(.0001) Report (.01)

Percent moisture in stack gas

$$PMOS = \frac{100 \times VWV}{VMSTD + VWV} = \frac{100 \times 5.4460}{31.6862 + 5.4460} = 14.667\ \%$$

5 Significant Digits Report
3 Significant Digits

3. **Mole fraction of dry gas**

$$MD = 1 - \left(\frac{VWV}{VMSTD + VWV}\right) = 1 - \left[\frac{5.4460}{31.6862 + 5.4460}\right] = 0.85333$$

(.00001) Report (.001)

4. **Molecular weight of dry stack gas**

$MWD = (\%CO_2 \times 0.440) + (\%O_2 \times 0.320) + (\%CO + \%N_2) \times 0.280$

$= (10.8 \times 0.440) + (8.2 \times 0.320) + (81.0 \times 0.280) =$ 30.056
(.0001) Report
(.01

5. **Molecular weight of wet stack gas**

$MW = MWD \times MD + 18.015\ (1 - MD) = 30.0560 \times 0.85333 + 18.015\ (1.00 - 0.85333) =$ 28.289
(.0001) Report
(.01

6. Average stack gas velocity at stack conditons, fpm

$$vs = 5129.4 \times Cp \times DPS \sqrt{\frac{TS + 459.69}{PS \times MW}}$$

$$= 5129.4 \times 0.84 \times 0.85507 \sqrt{\frac{179.178 + 459.69}{29.57 \times 28.2899}} = \underline{3219.7}\ \text{fpm}$$

(.1) Report (10)

7. Volumetric flowrate at standard conditions, DSCFM

$$QS = \frac{0.12247 \times vs \times AS \times MD \times PS}{(TS + 459.69)}$$

$$= \frac{0.12247 \times 3219.7 \times 40828.1 \times 0.85333 \times 29.57}{(179.178 + 459.69)} = \underline{635860}\ \text{DSCF}$$

Five Significant Digits Report
3 Significant Digits

8. Percent isokinetic

$$PERI = \frac{1039.6 \times (TS + 459.69) \times VMSTD}{vs \times TT \times PS \times MD \times (DN)^2}$$

$$= \frac{1039.6 \times (179.178 + 459.69) \times 31.6862}{3219.7 \times 84 \times 29.57 \times 0.85333 \times (0.172)^2} = \underline{104.238}\ \%$$

(.001) Report (.1)

9. Particulate loading at standard conditions, gr/DSCF

$$CAN = 0.015432 \times (^{MF}/VMSTD) = 0.015432 \times (91.2 / 31.6862) = \underline{.044168}\ \text{gr/DSCF}$$

5 Significant Digits Report
4 Significant Digits

10. Particulate loading at stack conditions, gr/ACF

$$CAT = \frac{17.636 \times CAN \times PS \times MD}{(TS + 459.69)}$$

$$= \frac{17.636 \times .044168 \times 29.57 \times .85333}{(179.178 + 459.69)} = \underline{.0309389}\ \text{gr/ACF}$$

(.000001) Report (.0001)

11. Particulate emission rate, lbs/hr.

CAW = 0.008571 x CAN x QS

= 0.008571 x .044168 x 635860 = 242.07 lbs/hr.
5 Significant Digits Report
3 Significant Digits

12. Particulate loading at standard conditons, lb/DSCF

C = CAN ÷ 7,000 = .044168 ÷ 7,000 = .000006345 lb/DSCF
5 Significant Digits Report
3 Significant Digits

13. Particulate emission rate, lb/MMBTU

$$E = C \times F \times \frac{20.9}{20.9 - \%O_2}$$

(F = DSCF/MMBTU, use 9820 for bituminous coal and O_2)

$$E = .000006345 \times 9820 \times \frac{20.9}{20.9 - 8.2}$$

E = .10254 lb/MMBTU
5 Significant Digits Report
3 Significant Digits

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KENVIRONS, INC.

Bechtel Calculations and Results

Facility	66E - CR6	Date of run	7-21-80
Project Number	80019	Date of Calculation	7-21-80
Run Number	BEC-STK- 5	Calculated By	JR Corrected By RCT 7/22

Name	Description	Units	Value
V1	Initial Meter Reading	dcf	591.049
V2	Final Meter Reading	dcf	624.905
VM	Dry gas volume, Meter condition	dcf	33.856
PB	Barometer pressure @ (Lab.)	in. Hg.	29.88
PBC	Barometer pressure corrected @ (console)	in. Hg.	29.66
PM	Average orifice pressure drop (ΔH)	in. Hg.	0.462 ✓
Y	Dry gas meter calibration factor (curve)		1.0155
TM	Average meter temperature	°F	115.2 ✓
(1) VMSTD	Dry gas volume, standard conditions	DSCF	31.32
VW	Total water collected	ml.	115.1
(2) PMOS	Percent moisture by volume	%	14.7
(3) MD	Mole fraction of dry gas	-	0.853
PCO2	Percent CO_2 by volume, dry	%	~~10.75~~ 10.6
PO2	Percent O_2 by volume, dry	% ?	~~8.08~~ 8.0
PCO	Percent CO by volume, dry	%	0.03 0.0
PN2	Percent N_2 by volume, dry	%	~~73.16~~ 91.2
(4) MWD	Molecular weight, dry stack gas	-	~~31.32~~ 30.
(5) MW	Molecular weight, wet stack gas	-	~~29.36~~ 29.
DPS	Average stack gas velocity head (Avg.$\sqrt{\Delta P}$)	in. H_2O	0.855 ✓
TS	Average stack temperature	°F	174.3 ✓
PS	Stack pressure, absolute	in. Hg.	29.60
(6) vs	Average stack gas velocity	fpm	~~3150~~ 3207
ID	Inside stack diameter	in.	228.0
AS	Stack area	sq. in.	40828.1
(7) QS	Stack flowrate, dry, standard conditions	DSCFM	626000
TT	Net time of run	min.	84
DN	Nozzle diameter	in.	0.172
(8) PERI	Percent isokinetic	%	~~104.6~~ 102.6
MF	Particulate weight, total	mg.	90.3
(9) CAN	Particulate loading, standard conditions	gr/DSCF	.0445
(10) CAT	Particulate loading, stack conditions	gr/ACF	.0312
(11) CAW	Particulate emission rate	lb/hr	239
(12) C	Particulate concentration, standard conditions	lb/DSCF	.00000636
F	"F" factor	DSCF/MMBTU	9820
(13) E	Emission rate (lb per million BTU)	lb/MMBTU	.102

1: Volume of dry gas sampled at standard conditions (68°F, 29.921" Hg.), DSCF

$$\text{VMSTD} = \frac{17.636 \times \text{VM} \times \text{Y}\left[\text{PBC} + \frac{\text{PM}}{13.6}\right]}{(\text{TM} + 459.69)} = \frac{17.636 \times 33.056 \times 1.0155\left[29.46 + \frac{0.462}{13.6}\right]}{(115.2 + 459.69)} =$$

31.3184 DSCF
(.0001) Report (.01)

2. Volume of water vapor at standard conditions, SCF

$\text{VWV} = 0.04707 \times \text{VW} = 0.04707 \times 115.1$ = 5.4178 SCF
(.0001) Report (.01)

Percent moisture in stack gas

$$\text{PMOS} = \frac{100 \times \text{VWV}}{\text{VMSTD} + \text{VWV}} = \frac{100 \times 5.4178}{31.3184 + 5.4178} = 14.748\ \%$$

5 Significant Digits=Report
3 Significant Digits

3. Mole fraction of dry gas

$$\text{MD} = 1 - \left(\frac{\text{VWV}}{\text{VMSTD} + \text{VWV}}\right) = 1 - \left[\frac{5.4178}{31.3184 + 5.4178}\right] = 0.85252$$

(.00001) Report (.001)

4. Molecular weight of dry stack gas

$$\text{MWD} = (\%\text{CO}_2 \times 0.440) + (\%\text{O}_2 \times 0.320) + (\%\text{CO} + \%\text{N}_2) \times 0.280$$

$$= (\underset{10.66}{\cancel{18.75}} \times 0.440) + (8.08 \times 0.320) + (\underset{81.23}{\cancel{73.19}} \times 0.280) = \overset{30.020}{\cancel{31.3200}}$$

(.0001) Report
(.01

5. Molecular weight of wet stack gas

$$\text{MW} = \text{MWD} \times \text{MD} + 18.015\ (1 - \text{MD}) = \overset{30.020}{\cancel{31.3200}} \times 0.85252 + 18.015\ (1.00 - 0.85252) = \overset{29.2498}{\cancel{29.3578}}$$

(.0001) Report
(.01

6. Average stack gas velocity at stack conditons, fpm

$$vs = 5129.4 \times Cp \times DPS \sqrt{\frac{TS + 459.69}{PS \times MW}}$$

$$= 5129.4 \times 0.84 \times 0.855 \sqrt{\frac{174.3 + 459.69}{29.60 \times \overset{}{\cancel{29.3578}}\ 29.2498}} = \underset{(.1)\text{ Report }(10)}{\underline{\overset{3207.7}{\cancel{3146.6}}}}\ \text{fpm}$$

7. Volumetric flowrate at standard conditions, DSCFM

$$QS = \frac{0.12247 \times vs \times AS \times MD \times PS}{(TS + 459.69)}$$

$$= \frac{0.12247 \times 3146.6 \times 40828.1 \times 0.85252 \times 29.60}{(174.3 + 459.69)} = \underset{\substack{\text{Five Significant Digits Report}\\ \text{3 Significant Digits}}}{\underline{626250}}\ \text{DSCF}$$

8. Percent isokinetic

$$PERI = \frac{1039.6 \times (TS + 459.69) \times VMSTD}{vs \times TT \times PS \times MD \times (DN)^2}$$

$$= \frac{1039.6 \times (174.3 + 459.69) \times 31.3184}{\underset{3207.7}{\cancel{3146.6}} \times 84 \times 29.60 \times 0.85252 \times (0.172)^2} = \underset{(.001)\text{ Report }(.1)}{\underline{\overset{102.62}{\cancel{104.610}}}}\ \%$$

9. Particulate loading at standard conditions, gr/DSCF

$$CAN = 0.015432 \times (^{MF}/VMSTD) = 0.015432 \times (90.3 / 31.3184) = \underset{\substack{\text{5 Significant Digits Report}\\ \text{4 Significant Digits}}}{\underline{.0444949}}\ \text{gr/DSCF}$$

10. Particulate loading at stack conditions, gr/ACF

$$CAT = \frac{17.636 \times CAN \times PS \times MD}{(TS + 459.69)}$$

$$= \frac{17.636 \times .0444949 \times 29.60 \times .85252}{(174.3 + 459.69)} = \underset{(.000001)\text{ Report }(.0001)}{\underline{.0312338}}\ \text{gr/ACF}$$

23.

11. Particulate emission rate, lbs/hr.

CAW = 0.008571 x CAN x QS

= 0.008571 x .0444949 x 626250 = 238.83 lbs/hr.
5 Significant Digits Report
3 Significant Digits

12. Particulate loading at standard conditons, lb/DSCF

C = CAN ÷ 7,000 = .0444949 ÷ 7,000 = .000006356 lb/DSCF
5 Significant Digits Report
3 Significant Digits

13. Particulate emission rate, lb/MMBTU

$$E = C \times F \times \frac{20.9}{20.9 - \%O_2}$$

(F = DSCF/MMBTU, use 9820 for bituminous coal and O_2)

$$E = .000006356 \times 9820 \times \frac{20.9}{20.9 - 8.08}$$

E = .10175 lb/MMBTU
5 Significant Digits Report
3 Significant Digits

KENVIRONS, INC.

Bechtel Calculations and Results

Facility LGE - CR6
Project Number 80019
Run Number BEC-STK-6
Date of run 7-22-80
Date of Calculation 7-22-80
Calculated By RCT

Name	Description	Units	Value
V1	Initial Meter Reading	dcf	631.445
V2	Final Meter Reading	dcf	664.263
VM	Dry gas volume, Meter condition	dcf	32.819
PB	Barometer pressure @ (Lab.)	in. Hg.	29.79
PBC	Barometer pressure corrected @ (console)	in. Hg.	29.57
PM	Average orifice pressure drop (ΔH)	in. Hg.	.4346
Y	Dry gas meter calibration factor (curve)		1.0145
TM	Average meter temperature	°F	103.21
(1) VMSTD	Dry gas volume, standard conditions	DSCF	30.8787
VW	Total water collected	ml.	111.7
(2) PMOS	Percent moisture by volume	%	14.55
(3) MD	Mole fraction of dry gas	-	0.85450
PCO2	Percent CO_2 by volume, dry	%	11.07
PO2	Percent O_2 by volume, dry	%	7.73
PCO	Percent CO by volume, dry	%	-0-
PN2	Percent N_2 by volume, dry	%	81.20
(4) MWD	Molecular weight, dry stack gas	-	30.0804
(5) MW	Molecular weight, wet stack gas	-	28.3249
DPS	Average stack gas velocity head (Avg.$\sqrt{\Delta P}$)	in. H_2O	.8546
TS	Average stack temperature	°F	175.9
PS	Stack pressure, absolute	in. Hg.	29.51
(6) vs	Average stack gas velocity	fpm	3210
ID	Inside stack diameter	in.	228
AS	Stack area	sq. in.	40828.1
(7) QS	Stack flowrate, dry, standard conditions	DSCFM	637,000
TT	Net time of run	min.	84
DN	Nozzle diameter	in.	0.172
(8) PERI	Percent isokinetic	%	101.40
MF	Particulate weight, total	mg.	91.3
(9) CAN	Particulate loading, standard conditions	gr/DSCF	.0456
(10) CAT	Particulate loading, stack conditions	gr/ACF	.0319
(11) CAW	Particulate emission rate	lb/hr	249
(12) C	Particulate concentration, standard conditions	lb/DSCF	.00000652
F	"F" factor	DSCF/MMBTU	9820
(13) E	Emission rate (lb per million BTU)	lb/MMBTU	.102

1. Volume of dry gas sampled at standard conditions (68°F, 29.921" Hg.), DSCF

23^6

$$VMSTD = \frac{17.636 \times VM \times Y \left[PBC + \frac{PM}{13.6}\right]}{(TM + 459.69)} = \frac{17.636 \times 32.919 \times 1.0145 \left[29.57 + \frac{0.44}{13.6}\right]}{(102.21 + 459.69)} =$$

30.8787 DSCF
(.0001) Report (.01)

2. Volume of water vapor at standard conditions, SCF

$$VWV = 0.04707 \times VW = 0.04707 \times 111.7 = 5.25772$$

(.0001) Report (.01) SCF

Percent moisture in stack gas

$$PMOS = \frac{100 \times VWV}{VMSTD + VWV} = \frac{100 \times 5.25772}{30.8787 + 5.25772} = 14.5496 \%$$

5 Significant Digits Report
3 Significant Digits

3. Mole fraction of dry gas

$$MD = 1 - \left(\frac{VWV}{VMSTD + VWV}\right) = 1 - \left[\frac{5.25772}{30.8787 + 5.25772}\right] = 0.85450$$

(.00001) Report (.001)

4. Molecular weight of dry stack gas

$$MWD = (\%CO_2 \times 0.440) + (\%O_2 \times 0.320) + (\%CO + \%N_2) \times 0.280$$

$$= (11.07 \times 0.440) + (7.73 \times 0.320) + (81.20 \times 0.280) = 30.0804$$

(.0001) Report
(.0

5. Molecular weight of wet stack gas

$$MW = MWD \times MD + 18.015\ (1 - MD) = 30.0804 \times 0.85450 + 18.015\ (1.00 - 0.85450) = 28.3249$$

(.0001) Report
(.0

6. Average stack gas velocity at stack conditons, fpm

$$vs = 5129.4 \times Cp \times DPS \sqrt{\frac{TS + 459.69}{PS \times MW}}$$

$$= 5129.4 \times 0.84 \times 0.8546 \sqrt{\frac{175.9 + 459.69}{29.51 \times 26.3249}} = \underset{\text{(.1) Report (10)}}{\underline{3210.91}} \text{ fpm}$$

7. Volumetric flowrate at standard conditions, DSCFM

$$QS = \frac{0.12247 \times vs \times AS \times MD \times PS}{(TS + 459.69)}$$

$$= \frac{0.12247 \times 3210.91 \times 40828.1 \times 0.8545 \times 29.51}{(175.9 + 459.69)} = \underline{636{,}973.31} \text{ DSCI}$$

Five Significant Digits Report
3 Significant Digits

8. Percent isokinetic

$$PERI = \frac{1039.6 \times (TS + 459.69) \times VMSTD}{vs \times TT \times PS \times MD \times (DN)^2}$$

$$= \frac{1039.6 \times (175.9 + 459.69) \times 30.8787}{3210.91 \times 84 \times 29.51 \times 0.8545 \times (0.172)^2} = \underset{\text{(.001) Report (.1)}}{\underline{101.40}}$$

9. Particulate loading at standard conditions, gr/DSCF

$$CAN = 0.015432 \times (MF/VMSTD) = 0.015432 \times (91.3 / 30.8787) = \underline{.0456283} \text{ gr/DSCF}$$

5 Significant Digits Report
4 Significant Digits

10. Particulate loading at stack conditions, gr/ACF

$$CAT = \frac{17.636 \times CAN \times PS \times MD}{(TS + 459.69)}$$

$$= \frac{17.636 \times .0456283 \times 29.51 \times .85450}{(175.9 + 459.69)} = \underset{\text{(.000001) Report (.0001)}}{\underline{.0319256}} \text{ gr/ACF}$$

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11. Particulate emission rate, lbs/hr.

CAW = 0.008571 x CAN x QS

= 0.008571 x .0456283 x 636973.31 = 249.11 lbs/hr.
5 Significant Digits Report
3 Significant Digits

12. Particulate loading at standard conditons, lb/DSCF

C = CAN ÷ 7,000 = .0456283 ÷ 7,000 = .000006518 lb/DSCF
5 Significant Digits Report
3 Significant Digits

13. Particulate emission rate, lb/MMBTU

$$E = C \times F \times \frac{20.9}{20.9 - \%O_2}$$

(F = DSCF/MMBTU, use 9820 for bituminous coal and O_2)

$$E = .000006518 \times 9820 \times \frac{20.9}{20.9 - 7.73}$$

E = .10157 lb/MMBTU
5 Significant Digits Report
3 Significant Digits

KENVIRONS, INC.

Bechtel Calculations and Results

Facility LGE-CR6 Date of run 7-23-80

Project Number 80019 Date of Calculation 7-23-80

Run Number BEC-STK-7 Calculated By RCJ

Name		Description	Units	Value
	V1	Initial Meter Reading	dcf	670.276
	V2	Final Meter Reading	dcf	699.707
	VM	Dry gas volume, Meter condition	dcf	29.431
	PB	Barometer pressure @ (Lab.)	in. Hg.	29.90
	PBC	Barometer pressure corrected @ (console)	in. Hg.	29.58
	PM	Average orifice pressure drop (ΔH)	in. Hg.	0.3643
	Y	Dry gas meter calibration factor (curve)		1.0115
	TM	Average meter temperature	°F	102.21
(1)	VMSTD	Dry gas volume, standard conditions	DSCF	27.66
	VW	Total water collected	ml.	93.2
(2)	PMOS	Percent moisture by volume	%	13.69
(3)	MD	Mole fraction of dry gas	-	0.86312
	PCO2	Percent CO_2 by volume, dry	%	10.53
	PO2	Percent O_2 by volume, dry	%	7.85
	PCO	Percent CO by volume, dry	%	0.12
	PN2	Percent N_2 by volume, dry	%	81.5
(4)	MWD	Molecular weight, dry stack gas	-	29.30
(5)	MW	Molecular weight, wet stack gas	-	28.36
	DPS	Average stack gas velocity head (Avg.$\sqrt{\Delta P}$)	in. H_2O	0.76201
	TS	Average stack temperature	°F	170.71
	PS	Stack pressure, absolute	in. Hg.	29.52
(6)	vs	Average stack gas velocity	fpm	2850
	ID	Inside stack diameter	in.	228
	AS	Stack area	sq. in.	40,828.1
(7)	QS	Stack flowrate, dry, standard conditions	DSCFM	576,000
	TT	Net time of run	min.	84
	DN	Nozzle diameter	in.	0.172
(8)	PERI	Percent isokinetic	%	100.54
	MF	Particulate weight, total	mg.	81.1
(9)	CAN	Particulate loading, standard conditions	gr/DSCF	.0452
(10)	CAT	Particulate loading, stack conditions	gr/ACF	.0322
(11)	CAW	Particulate emission rate	lb/hr	223
(12)	C	Particulate concentration, standard conditions	lb/DSCF	.00000646
	F	"F" factor	DSCF/MMBTU	9820
(13)	E	Emission rate (lb per million BTU)	lb/MMBTU	.102

1. Volume of dry gas sampled at standard conditions (68°F, 29.921" Hg.), DSCF

$$\text{VMSTD} = \frac{17.636 \times \text{VM} \times \text{Y}\left[\text{PBC} + \frac{\text{PM}}{13.6}\right]}{(\text{TM} + 459.69)} = \frac{17.636 \times 29.421 \times 1.0115\left[29.58 + \frac{0.364}{13.6}\right]}{(102.2 + 459.69)} =$$

27.6632 DSCF
(.0001) Report (.01)

2. Volume of water vapor at standard conditions, SCF

$$\text{VWV} = 0.04707 \times \text{VW} = 0.04707 \times 93.2 = 4.3869$$

(.0001) Report (.01) SCF

Percent moisture in stack gas

$$\text{PMOS} = \frac{100 \times \text{VWV}}{\text{VMSTD} + \text{VWV}} = \frac{100 \times 4.3869}{27.6632 + 4.3869} = 13.687\ \%$$

5 Significant Digits Report
3 Significant Digits

3. Mole fraction of dry gas

$$\text{MD} = 1 - \left(\frac{\text{VWV}}{\text{VMSTD} + \text{VWV}}\right) = 1 - \left[\frac{4.3869}{27.6622 + 4.3869}\right] = 0.86312$$

(.00001) Report (.001)

4. Molecular weight of dry stack gas

$$\text{MWD} = (\%\text{CO}_2 \times 0.440) + (\%\text{O}_2 \times 0.320) + (\%\text{CO} + \%\text{N}_2) \times 0.280$$

$$= (10.53 \times 0.440) + (7.95 \times 0.320) + (81.62 \times 0.280) = 29.9998$$

(.0001) Report
(.(

5. Molecular weight of wet stack gas

$$\text{MW} = \text{MWD} \times \text{MD} + 18.015\ (1 - \text{MD}) = 29.9989 \times 0.86312 + 18.015\ (1.00 - 0.86312) = 29.359$$

(.0001) Report
(.(

6. Average stack gas velocity at stack conditons, fpm

$$vs = 5129.4 \times Cp \times DPS \sqrt{\frac{TS + 459.69}{PS \times MW}}$$

$$= 5129.4 \times 084 \times 0.26201 \sqrt{\frac{170.71 + 459.69}{29.52 \times 29.395}} = \underset{(.1)\ \text{Report}\ (10)}{\underline{2847.82}}\ \text{fp}$$

7. Volumetric flowrate at standard conditions, DSCFM

$$QS = \frac{0.12247 \times vs \times AS \times MD \times PS}{(TS + 459.69)}$$

$$= \frac{0.12247 \times 2847.82 \times 40829.1 \times 0.96312 \times 29.52}{(170.71 + 459.69)} = \underline{575,536.34}\ \text{DSC}$$

Five Significant Digits Report
3 Significant Digits

8. Percent isokinetic

$$PERI = \frac{1039.6 \times (TS + 459.69) \times VMSTD}{vs \times TT \times PS \times MD \times (DN)^2}$$

$$= \frac{1039.6 \times (170.71 + 459.69) \times 27.6632}{2847.82 \times 84 \times 29.52 \times 0.96312 \times (0.172)^2} = \underset{(.001)\ \text{Report}\ (.1)}{\underline{100.54}}$$

9. Particulate loading at standard conditions, gr/DSCF

$$CAN = 0.015432 \times (^{MF}/VMSTD) = 0.015432 \times (81.1\ /276632) = \underline{.045249}\ \text{gr/DSCF}$$

5 Significant Digits Report
4 Significant Digits

10. Particulate loading at stack conditions, gr/ACF

$$CAT = \frac{17.636 \times CAN \times PS \times MD}{(TS + 459.69)}$$

$$= \frac{17.636 \times .045249 \times 29.52 \times .96312}{(170.71 + 459.69)} = \underset{(.000001)\ \text{Report}\ (.0001)}{\underline{.0322487}}\ \text{gr/ACF}$$

11. Particulate emission rate, lbs/hr.

CAW = 0.008571 x CAN x QS

= 0.008571 x .0452419 x 575536.34 = 223.17 lbs/hr.

5 Significant Digits Report
3 Significant Digits

12. Particulate loading at standard conditons, lb/DSCF

C = CAN ÷ 7,000 = .0452419 ÷ 7,000 = .000006463 lb/DSCF

5 Significant Digits Report
3 Significant Digits

13. Particulate emission rate, lb/MMBTU

$$E = C \times F \times \frac{20.9}{20.9 - \%O_2}$$

(F = DSCF/MMBTU, use 9820 for bituminous coal and O_2)

$$E = .000006463 \times 9820 \times \frac{20.9}{20.9 - 7.85}$$

E = .10164 lb/MMBTU

5 Significant Digits Report
3 Significant Digits

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KENVIRONS, INC.

Calculations and Results

Facility Beckell LGE - CR6 Stk
Date of run 7-24-80
Project Number 80019
Date of Calculation 7-24-80
Run Number BEC-STK-8
Calculated By PFR

Name	Description	Units	Value
V1	Initial Meter Reading	dcf	707.521
V2	Final Meter Reading	dcf	738.499
VM	Dry gas volume, Meter condition	dcf	30.978
PB	Barometer pressure @ (Lab.)	in. Hg.	29.82
PBC	Barometer pressure corrected @ (console)	in. Hg.	29.60
PM	Average orifice pressure drop (ΔH)	in. Hg.	.3971
Y	Dry gas meter calibration factor (curve)		1.013
TM	Average meter temperature	°F	100.25
(1) VMSTD	Dry gas volume, standard conditions	DSCF	29.2847
VW	Total water collected	ml.	109.1
(2) PMOS	Percent moisture by volume	%	14.92
(3) MD	Mole fraction of dry gas	-	.85080
PCO2	Percent CO_2 by volume, dry	%	10.85
PO2	Percent O_2 by volume, dry	%	7.7
PCO	Percent CO by volume, dry	%	0
PN2	Percent N_2 by volume, dry	%	81.45
(4) MWD	Molecular weight, dry stack gas	-	30.0440
(5) MW	Molecular weight, wet stack gas	-	28.2493
DPS	Average stack gas velocity head (Avg. $\sqrt{\Delta P}$)	in. H_2O	.8238
TS	Average stack temperature	°F	167.8
PS	Stack pressure, absolute	in. Hg.	29.55
(6) vs	Average stack gas velocity	fpm	3077.4
ID	Inside stack diameter	in.	228
AS	Stack area	sq. in.	40828.1
(7) QS	Stack flowrate, dry, standard conditions	DSCFM	616530
TT	Net time of run	min.	84
DN	Nozzle diameter	in.	.172
(8) PERI	Percent isokinetic	%	99.359
MF	Particulate weight, total	mg.	76.3
(9) CAN	Particulate loading, standard conditions	gr/DSCF	.0402
(10) CAT	Particulate loading, stack conditions	gr/ACF	.0284
(11) CAW	Particulate emission rate	lb/hr	212
(12) C	Particulate concentration, standard conditions	lb/DSCF	.00000574
F	"F" factor	DSCF/MMBTU	9820
(13) E	Emission rate (lb per million BTU)	lb/MMBTU	.0893

7 #2

1. Volume of dry gas sampled at standard conditions (68°F, 29.921" Hg.), DSCF

$$\text{VMSTD} = \frac{17.636 \times \text{VM} \times \text{Y}\left[\text{PBC} + \frac{\text{PM}}{13.6}\right]}{(\text{TM} + 459.69)} = \frac{17.636 \times 30.978 \times 1.013 \left[29.60 + \frac{.3971}{13.6}\right]}{(100.25 + 459.69)} =$$

29.2847 DSCF
(.0001) Report (.01)

2. Volume of water vapor at standard conditions, SCF

$$\text{VWV} = 0.04707 \times \text{VW} = 0.04707 \times 109.1 = 5.1353 \text{ SCF}$$

(.0001) Report (.01)

Percent moisture in stack gas

$$\text{PMOS} = \frac{100 \times \text{VWV}}{\text{VMSTD} + \text{VWV}} = \frac{100 \times 5.1353}{29.2847 + 5.1353} = 14.920\ \%$$

5 Significant Digits Report
3 Significant Digits

3. Mole fraction of dry gas

$$\text{MD} = 1 - \left(\frac{\text{VWV}}{\text{VMSTD} + \text{VWV}}\right) = 1 - \left[\frac{5.1353}{29.2847 + 5.1353}\right] = .85080$$

(.00001) Report (.001)

4. Molecular weight of dry stack gas

$$\text{MWD} = (\%\text{CO}_2 \times 0.440) + (\%\text{O}_2 \times 0.320) + (\%\text{CO} + \%\text{N}_2) \times 0.280$$

$$= (10.85 \times 0.440) + (7.7 \times 0.320) + (81.45 \times 0.280) = 30.0440$$

(.0001) Report
(.0

5. Molecular weight of wet stack gas

$$\text{MW} = \text{MWD} \times \text{MD} + 18.015\,(1 - \text{MD}) = 30.044 \times .85080 + 18.015\,(1.00 - .85080) = 28.2493$$

(.0001) Report
(.0

6. Average stack gas velocity at stack conditons, fpm

$$vs = 5129.4 \times Cp \times DPS \sqrt{\frac{TS + 459.69}{PS \times MW}}$$

$$= 5129.4 \times .84 \times .8238 \sqrt{\frac{167.8 + 459.69}{29.55 \times 28.2493}} = \underset{(.1)\ \text{Report}\ (10)}{\underline{3077.4}}\ \text{fp}$$

7. Volumetric flowrate at standard conditions, DSCFM

$$QS = \frac{0.12247 \times vs \times AS \times MD \times PS}{(TS + 459.69)}$$

$$= \frac{0.12247 \times 3077.4 \times 40828.1 \times .85080 \times 29.55}{(167.8 + 459.69)} = \underset{\substack{\text{Five Significant Digits Report} \\ \text{3 Significant Digits}}}{\underline{616530.}}\ \text{DSC}$$

8. Percent isokinetic

$$PERI = \frac{1039.6 \times (TS + 459.69) \times VMSTD}{vs \times TT \times PS \times MD \times (DN)^2}$$

$$= \frac{1039.6 \times (167.8 + 459.69) \times 29.2847}{3077.4 \times 84 \times 29.55 \times .85080 \times (.172)^2} = \underset{(.001)\ \text{Report}\ (.1)}{\underline{99.359}}$$

9. Particulate loading at standard conditions, gr/DSCF

$$CAN = 0.015432 \times ({}^{MF}/VMSTD) = 0.015432 \times (76.3 / 29.2847) = \underset{\substack{\text{5 Significant Digits Report} \\ \text{4 Significant Digits}}}{\underline{.0402074}}\ \text{gr/DSCF}$$

10. Particulate loading at stack conditions, gr/ACF

$$CAT = \frac{17.636 \times CAN \times PS \times MD}{(TS + 459.69)}$$

$$= \frac{17.636 \times .0402074 \times 29.55 \times .85080}{(167.8 + 459.69)} = \underset{(.000001)\ \text{Report}\ (.0001)}{\underline{.028408}}\ \text{gr/ACF}$$

11. Particulate emission rate, lbs/hr.

CAW = 0.008571 x CAN x QS

= 0.008571 x .0402074 x 616530 = 212.47 lbs/hr.

5 Significant Digits Report
3 Significant Digits

12. Particulate loading at standard conditons, lb/DSCF

C = CAN ÷ 7,000 = .0402074 ÷ 7,000 = .000005743 lb/DSCF

5 Significant Digits Report
3 Significant Digits

13. Particulate emission rate, lb/MMBTU

$$E = C \times F \times \frac{20.9}{20.9 - \%O_2}$$

(F = DSCF/MMBTU, use 9820 for bituminous coal and O_2)

$$E = .000005743 \times 9820 \times \frac{20.9}{20.9 - 7.7}$$

E = .089294 lb/MMBTU

5 Significant Digits Report
3 Significant Digits

705

KENVIRONS, INC.

Calculations and Results

Facility	LG&E Cane Run 6	Date of run	7/25/80
Project Number	80019	Date of Calculation	7/25/80
Run Number	DEC-STK-9	Calculated By	RHM

Name	Description	Units	Value
V1	Initial Meter Reading	dcf	744.330
V2	Final Meter Reading	dcf	777.342
VM	Dry gas volume, Meter condition	dcf	33.012
PB	Barometer pressure @ (Lab.)	in. Hg.	29.84
PBC	Barometer pressure corrected @ (console)	in. Hg.	29.62
PM	Average orifice pressure drop (ΔH)	in. Hg.	0.4367857
Y	Dry gas meter calibration factor (curve)		1.0135
TM	Average meter temperature	°F	104.6607
(1) VMSTD	Dry gas volume, standard conditions	DSCF	31.00
VW	Total water collected	ml.	110.0
(2) PMOS	Percent moisture by volume	%	~~5.44~~ 14.31
(3) MD	Mole fraction of dry gas	-	0.857
PCO2	Percent CO_2 by volume, dry	%	10.7
PO2	Percent O_2 by volume, dry	%	7.88
PCO	Percent CO by volume, dry	%	0
PN2	Percent N_2 by volume, dry	%	81.42
(4) MWD	Molecular weight, dry stack gas	-	30.03
(5) MW	Molecular weight, wet stack gas	-	28.31
DPS	Average stack gas velocity head (Avg.$\sqrt{\Delta P}$)	in. H_2O	0.8596996
TS	Average stack temperature	°F	174.67857
PS	Stack pressure, absolute	in. Hg.	29.57
(6) vs	Average stack gas velocity	fpm	3220
ID	Inside stack diameter	in.	228
AS	Stack area	sq. in.	40828.1
(7) QS	Stack flowrate, dry, standard conditions	DSCFM	643000
TT	Net time of run	min.	84
DN	Nozzle diameter	in.	0.172
(8) PERI	Percent isokinetic	%	100.7
MF	Particulate weight, total	mg.	98.4
(9) CAN	Particulate loading, standard conditions	gr/DSCF	.0490
(10) CAT	Particulate loading, stack conditions	gr/ACF	.0345
(11) CAW	Particulate emission rate	lb/hr	270
(12) C	Particulate concentration, standard conditions	lb/DSCF	.00000700
F	"F" factor	DSCF/MMBTU	9820
(13) E	Emission rate (lb per million BTU)	lb/MMBTU	.110

1. Volume of dry gas sampled at standard conditions (68°F, 29.921" Hg.), DSCF

$$\text{VMSTD} = \frac{17.636 \times \text{VM} \times \text{Y}\left[\text{PBC} + \frac{\text{PM}}{13.6}\right]}{(\text{TM} + 459.69)} = \frac{17.636 \times 33.012 \times 1.0135\left[29.62 + \frac{0.9347457}{13.6}\right]}{(104.6667 + 459.69)} =$$

31.0029 DSCF
(.0001) Report (.01)

2. Volume of water vapor at standard conditions, SCF

$$\text{VWV} = 0.04707 \times \text{VW} = 0.04707 \times 110.0 = 5.1777$$ SCF
(.0001) Report (.01)

Percent moisture in stack gas

$$\text{PMOS} = \frac{100 \times \text{VWV}}{\text{VMSTD} + \text{VWV}} = \frac{100 \times 5.1777}{31.00 + 5.1777} = 14.312$$ %
5 Significant Digits Report
3 Significant Digits

3. Mole fraction of dry gas

$$\text{MD} = 1 - \left(\frac{\text{VWV}}{\text{VMSTD} + \text{VWV}}\right) = 1 - \left[\frac{5.1777}{31.00 + 5.1777}\right] = 0.85688$$
(.00001) Report (.001)

4. Molecular weight of dry stack gas

$$\text{MWD} = (\%CO_2 \times 0.440) + (\%O_2 \times 0.320) + (\%CO + \%N_2) \times 0.280$$

$$= (10.7 \times 0.440) + (7.88 \times 0.320) + (0 + 81.42 \times 0.280) = 30.0272$$
(.0001) Report
(.

5. Molecular weight of wet stack gas

$$\text{MW} = \text{MWD} \times \text{MD} + 18.015\,(1 - \text{MD}) = 30.0272 \times 0.85688 + 18.015\,(1.00 - 0.85688) = 28.3080$$
(.0001) Report
(.

6. Average stack gas velocity at stack conditons, fpm

$$vs = 5129.4 \times Cp \times DPS \sqrt{\frac{TS + 459.69}{PS \times MW}}$$

$$= 5129.4 \times 0.84 \times 0.8596496 \sqrt{\frac{174.67857 + 459.69}{29.57 \times 28.31}} = \underline{3224.5} \text{ fp}$$

(.1) Report (10)

7. Volumetric flowrate at standard conditions, DSCFM

$$QS = \frac{0.12247 \times vs \times AS \times MD \times PS}{(TS + 459.69)}$$

$$= \frac{0.12247 \times 3224.5 \times 40828.1 \times 0.85698 \times 29.57}{(174.67857 + 459.69)} = \underline{\overset{643990}{643992.}} \text{ DSC}$$

Five Significant Digits Report
3 Significant Digits

8. Percent isokinetic

$$PERI = \frac{1039.6 \times (TS + 459.69) \times VMSTD}{vs \times TT \times PS \times MD \times (DN)^2}$$

$$= \frac{1039.6 \times (174.67857 + 459.69) \times 31.0029}{3224.5 \times 84 \times 29.57 \times 0.85688 \times (0.172)^2} = \underline{100.703}$$

(.001) Report (.1)

9. Particulate loading at standard conditions, gr/DSCF

$$CAN = 0.015432 \times (^{MF}/VMSTD) = 0.015432 \times (98.4 / 31.0029) = \underline{.0489796} \text{ gr/DSCF}$$

5 Significant Digits Report
4 Significant Digits

10. Particulate loading at stack conditions, gr/ACF

$$CAT = \frac{17.636 \times CAN \times PS \times MD}{(TS + 459.69)}$$

$$= \frac{17.636 \times .0489796 \times 29.57 \times .85698}{(174.68 + 459.69)} = \underline{.0345020} \text{ gr/ACF}$$

(.000001) Report (.0001)

11. Particulate emission rate, lbs/hr.

CAW = 0.008571 x CAN x QS

= 0.008571 x .0489796 x 643992 = 270.35 lbs/hr.
5 Significant Digits Report
3 Significant Digits

12. Particulate loading at standard conditons, lb/DSCF

C = CAN ÷ 7,000 = .0489796 ÷ 7,000 = .000006997 lb/DSCF
5 Significant Digits Report
3 Significant Digits

13. Particulate emission rate, lb/MMBTU

$$E = C \times F \times \frac{20.9}{20.9 - \%O_2}$$

(F = DSCF/MMBTU, use 9820 for bituminous coal and O_2)

$$E = .000006997 \times 9820 \times \frac{20.9}{20.9 - 7.88}$$

E = .11030 lb/MMBTU
5 Significant Digits Report
3 Significant Digits

20

KENVIRONS, INC.

Bechtel Calculations and Results

Facility LGE - CR6 Date of run 7-26-80

Project Number 80019 Date of Calculation 7-26-80

Run Number BEC-STK-10 Calculated By RCJ

Name		Description	Units	Value
	V1	Initial Meter Reading	dcf	783.999
	V2	Final Meter Reading	dcf	815.393
	VM	Dry gas volume, Meter condition	dcf	31.394
	PB	Barometer pressure @ (Lab.)	in. Hg.	29.78
	PBC	Barometer pressure corrected @ (console)	in. Hg.	29.56
	PM	Average orifice pressure drop (ΔH)	in. Hg.	0.3982
	Y	Dry gas meter calibration factor (curve)		1.013
	TM	Average meter temperature	°F	105.125
(1)	VMSTD	Dry gas volume, standard conditions	DSCF	29.37
	VW	Total water collected	ml.	100.6
(2)	PMOS	Percent moisture by volume	%	13.9
(3)	MD	Mole fraction of dry gas	-	0.861
	PCO2	Percent CO_2 by volume, dry	%	10.68
	PO2	Percent O_2 by volume, dry	%	7.92
	PCO	Percent CO by volume, dry	%	0.08
	PN2	Percent N_2 by volume, dry	%	81.32
(4)	MWD	Molecular weight, dry stack gas	-	30.03
(5)	MW	Molecular weight, wet stack gas	-	28.36
	DPS	Average stack gas velocity head (Avg.$\sqrt{\Delta P}$)	in. H_2O	~~0.6911~~ 0.823.
	TS	Average stack temperature	°F	172.5
	PS	Stack pressure, absolute	in. Hg.	29.50
(6)	vs	Average stack gas velocity	fpm	3090
	ID	Inside stack diameter	in.	228
	AS	Stack area	sq. in.	40828.1
(7)	QS	Stack flowrate, dry, standard conditions	DSCFM	620,000
	TT	Net time of run	min.	84
	DN	Nozzle diameter	in.	0.172
(8)	PERI	Percent isokinetic	%	99.176
	MF	Particulate weight, total	mg.	86.0
(9)	CAN	Particulate loading, standard conditions	gr/DSCF	.0452
(10)	CAT	Particulate loading, stack conditions	gr/ACF	.0320
(11)	CAW	Particulate emission rate	lb/hr	240
(12)	C	Particulate concentration, standard conditions	lb/DSCF	.00000645
	F	"F" factor	DSCF/MMBTU	9820
(13)	E	Emission rate (lb per million BTU)	lb/MMBTU	.102

1. Volume of dry gas sampled at standard conditions (68°F, 29.921" Hg.), DSCF

$$\text{VMSTD} = \frac{17.636 \times \text{VM} \times \text{Y}\left[\text{PBC} + \frac{\text{PM}}{13.6}\right]}{(\text{TM} + 459.69)} = \frac{17.636 \times 31.384 \times 1.013\left[29.56 + \frac{0.398}{13.6}\right]}{(105.125 + 459.69)} =$$

29.3728 DSCF
(.0001) Report (.01)

2. Volume of water vapor at standard conditions, SCF

$$\text{VWV} = 0.04707 \times \text{VW} = 0.04707 \times 100.6 = 4.7352$$ SCF
(.0001) Report (.01)

Percent moisture in stack gas

$$\text{PMOS} = \frac{100 \times \text{VWV}}{\text{VMSTD} + \text{VWV}} = \frac{100 \times 4.7352}{29.3728 + 4.7352} = 13.88$$ %
5 Significant Digits Report
3 Significant Digits

3. Mole fraction of dry gas

$$\text{MD} = 1 - \left(\frac{\text{VWV}}{\text{VMSTD} + \text{VWV}}\right) = 1 - \left[\frac{4.7352}{29.3728 + 4.7352}\right] = 0.86117$$
(.00001) Report (.001)

4. Molecular weight of dry stack gas

$$\text{MWD} = (\%CO_2 \times 0.440) + (\%O_2 \times 0.320) + (\%CO + \%N_2) \times 0.280$$

$$= (10.68 \times 0.440) + (7.92 \times 0.320) + (81.40 \times 0.280) = 30.0256$$
(.0001) Report
(.0

5. Molecular weight of wet stack gas

$$\text{MW} = \text{MWD} \times \text{MD} + 18.015\,(1 - \text{MD}) = 30.0256 \times 0.86117 + 18.015\,(1.00 - 0.86117) = 28.3592$$
(.0001) Report
(.0

6. Average stack gas velocity at stack conditons, fpm

$$vs = 5129.4 \times Cp \times DPS \sqrt{\frac{TS + 459.69}{PS \times MW}}$$

$$= 5129.4 \times 0.84 \times 0.82316 \sqrt{\frac{172.5 + 459.69}{29.50 \times 29.3582}} = \underline{3083.21} \text{ fpm}$$

(.1) Report (10)

7. Volumetric flowrate at standard conditions, DSCFM

$$QS = \frac{0.12247 \times vs \times AS \times MD \times PS}{(TS + 459.69)}$$

$$= \frac{0.12247 \times 3083.21 \times 40829.1 \times 0.96117 \times 29.50}{(172.5 + 459.69)} = \underline{619{,}519.9} \text{ DSCFM}$$

Five Significant Digits Report 3 Significant Digits

8. Percent isokinetic

$$PERI = \frac{1039.6 \times (TS + 459.69) \times VMSTD}{vs \times TT \times PS \times MD \times (DN)^2}$$

$$= \frac{1039.6 \times (172.5 + 459.69) \times 29.3728}{3083.21 \times 84 \times 29.50 \times 0.96117 \times (0.172)^2} = \underline{99.176}$$

(.001) Report (.1)

0.524

9. Particulate loading at standard conditions, gr/DSCF

$$CAN = 0.015432 \times (MF/VMSTD) = 0.015432 \times (86.0 / 29.3728) = \underline{.045830} \text{ gr/DSCF}$$

6 Significant Digits Report 4 Significant Digits

10. Particulate loading at stack conditions, gr/ACF

$$CAT = \frac{17.636 \times CAN \times PS \times MD}{(TS + 459.69)}$$

$$= \frac{17.636 \times .045830 \times 29.50 \times .86117}{(172.5 + 459.69)} = \underline{.0320213} \text{ gr/ACF}$$

(.000001) Report (.0001)

11. Particulate emission rate, lbs/hr.

CAW = 0.008571 x CAN x QS

= 0.008571 x .0451830 x 619519.9 = 239.92 lbs/hr.
5 Significant Digits Report
3 Significant Digits

12. Particulate loading at standard conditons, lb/DSCF

C = CAN ÷ 7,000 = .0451830 ÷ 7,000 = .000006454 lb/DSCF
5 Significant Digits Report
3 Significant Digits

13. Particulate emission rate, lb/MMBTU

$$E = C \times F \times \frac{20.9}{20.9 - \%O_2}$$

(F = DSCF/MMBTU, use 9820 for bituminous coal and O_2)

$$E = .000006454 \times 9820 \times \frac{20.9}{20.9 - 7.92}$$

E = .10205 lb/MMBTU
5 Significant Digits Report
3 Significant Digits

Appendix I. Final Computer Calculations

(Sequence: Runs 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10; sequence for each run: ESP-A, ESP-B, STK, and Summary)
(Runs start on pp: I-1, I-9, I-15, I-21, I-27, I-33, I-39, I-45, I-51, I-57)

2(3)

```
OUTPUT DATE - 08/27/80
      TIME - 14:30:50                                    KENVIRONS, INC.
                                                         PROJECT NO. 80019
-------------------------------------------------------------------------------
        BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
-------------------------------------------------------------------------------

9. STACK GAS VOLUMETRIC FLOW AT STACK CONDITIONS, ACFM

        QA     =   QS * (TS + 459.69)
                 ---------------------
                  17.636 * PS * MD

10. PERCENT ISOKINETIC

        PERI   =  1039.6 * (TS + 459.69) * VWSTD
                 --------------------------------
                  VS * TT * PS * MD * (DN ** 2)

11. TOTAL PARTICULATE LOADING AT STANDARD CONDITIONS, GR/DSCF

        CAN    = 0.015432 * (MF / VMSTD)

11.A. TOTAL PARTICULATE LOADING AT STANDARD CONDITIONS, LB/DSCF

        C      = CAN / 7000.0

12. TOTAL PARTICULATE LOADING AT STACK CONDITIONS, GR/ACF

        CAT    =  17.636 * CAN * PS * MD
                 -------------------------
                       TS + 459.69

13. TOTAL PARTICULATE EMISSION RATE, LBS/HR

        CAW    = 0.008571 * CAN * QS

14. EMISSION RATE, LB/MMBTU

        E      = C * F * 20.9 / (20.9 - PO2)

15. SO2 CONCENTRATION AT STANDARD CONDITIONS, LB/DSCF

                 7.061E-5 * NBACL2 * (VT-VTB) * (VSOLN/VA)
        SCONC = --------------------------------------------
                                   VMSTD

16. SO2 CONCENTRATION AT STACK CONDITIONS, LB/ACF

                 17.636 * SCONC * PS * MD
        SCONCA= -------------------------
                       TS + 459.69
```

```
17. SO2 EMISSION RATE, LB/HR

      SCHR  = 60.0 * SCONC * QS

18. SO2 EMISSION RATE, LB/MMBTU

      SCMM  = SCONC * F * (20.9 / (20.9 - PO2))

19. SO2 CONCENTRATION AT STANDARD (DRY) CONDITIONS, PPM (VOL.)

      SCPPM = SCONC / (64.0 * 2.59E-9)

20. SO2 CONCENTRATION AT STACK (WET) CONDITIONS, PPM (VOL.)

      SCPPMA= SCPPM * MD
```

```
OUTPUT DATE - 08/18/80                                          KENVIRONS, INC.
       TIME - 11:55:40                                          PROJECT NO. 80019
--------------------------------------------------------------------------------------
           BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
--------------------------------------------------------------------------------------

                   PARTICULATE AND SO2 DATA WITH CALCULATED VALUES

                                  RUN - ESPA01
                                  DATE- 07/17/80

ATMOS  ATMOS  STACK   H2O    PARTIC  STACK   INIT    PERC PERC PERC PITOT
TEMP   PRES   PRES    COND   WT-TTL  AREA    VOL     O2   CO2  CO   TUBE
(DG.F) (I.HG) (I.HG)  (ML)   (MG)    (IN2)   (DCF)   DRY  DRY  DRY  COEF

  95   29.61  28.46   81.1   628.70  33618   115.90  7.7 12.0  0.0 0.840


     NBACL2        VT        VTB     VSOLN      VA
      (N)         (ML)      (ML)     (ML)      (ML)

 0.01021000      21.68      0.02    1000.0     1.0


PORT- SAMP  METER    DELTA    DELTA  TEMP  TEMP  TRAIN  STACK  BOX  BATH  PROBE   VEL
POINT TIME   VOL       P        H     IN    OUT   VAC   TEMP  TEMP  TEMP  T DIA
      (MIN) (DCF)  (I.H2O)  (I.H2O)  (F)   (F)  (I.HG)   (F)   (F)   (F)   (IN)  (FPM)

AA 1   2.0  116.70  0.200    0.440    97    95    4.2    262   245     - 0.238   1797
AA 2   2.0  117.66  0.350    0.720   101    97    5.2    322   260     - 0.238   2473
AA 3   2.0  118.62  0.310    0.630   102    97    5.0    334   260    68 0.238   2346
AA 4   2.0  119.56  0.350    0.670   104    98    5.1    337   270    67 0.238   2497
AA 5   2.0  120.55  0.400    0.760   106    98    5.6    341   280    68 0.238   2676
AB 1   2.0  121.39  0.240    0.540   102    99    4.2    200   260     - 0.238   1882
AB 2   2.0  122.37  0.400    0.820   106    99    5.8    306   255     - 0.238   2617
AB 3   2.0  123.39  0.400    0.820   107   100    6.0    333   260    68 0.238   2663
AB 4   2.0  124.36  0.350    0.680   108   100    5.2    341   270    67 0.238   2503
AB 5   2.0  125.39  0.430    0.830   109   100    6.0    341   285    67 0.238   2775
AC 1   2.0  126.12  0.180    0.400   104   101    3.7    154   280     - 0.238   1572
AC 2   2.0  126.98  0.310    0.630   108   101    4.9    308   295     - 0.238   2307
AC 3   2.0  127.87  0.300    0.610   109   101    4.9    331   290    73 0.238   2303
AC 4   2.0  128.70  0.260    0.500   110   102    4.2    335   275    71 0.238   2149
AC 5   2.0  129.56  0.290    0.560   110   102    4.7    345   280    72 0.238   2284
AD 1   2.0  130.26  0.170    0.380   106   103    3.3    195   285     - 0.238   1578
AD 2   2.0  131.03  0.230    0.470   109   103    4.0    308   290    77 0.238   1987
AD 3   2.0  131.83  0.250    0.480   110   103    4.1    338   280    74 0.238   2112
AD 4   2.0  132.60  0.230    0.440   111   103    3.9    339   285    73 0.238   2027
AD 5   2.0  133.42  0.270    0.520   111   104    4.2    329   285    70 0.238   2182
AE 1   2.0  133.87  0.070    0.150   102   104    2.1    140   255     - 0.238    969
AE 2   2.0  134.24  0.050    0.100   104   105    0.0    301   255     - 0.238    922
AE 3   2.0  134.68  0.090    0.170   105   105    0.0    324   255    81 0.238   1256
AE 4   2.0  135.32  0.180    0.340   107   105    3.3    330   255    71 0.238   1783
AE 5   2.0  135.98  0.170    0.330   108   105    3.3    329   260    72 0.238   1731
AF 1   2.0  136.51  0.080    0.170   103   103    2.2    291   245     - 0.238   1159
AF 2   2.0  137.08  0.130    0.260   105   104    2.9    302   245     - 0.238   1488
AF 3   2.0  137.61  0.090    0.180   105   104    2.5    320   250    72 0.238   1253
```

```
OUTPUT DATE - 08/18/80                                        KENVIRONS, INC.
       TIME - 11:55:40                                        PROJECT NO. 80019
-------------------------------------------------------------------------------
        BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
-------------------------------------------------------------------------------

 PORT- SAMP  METER    DELTA    DELTA  TEMP TEMP  TRAIN STACK  BOX BATH PROBE   VEL
 POINT TIME   VOL       P        H     IN   OUT   VAC   TEMP TEMP TEMP T DIA
      (MIN)  (DCF) (I.H2O) (I.H2O)  (F)  (F) (I.HG)   (F)  (F)  (F)  (IN) (FPM)

 AF 4   2.0  138.32  0.210   0.420  108  104    3.9   320  250   68 0.238  1913
 AF 5   2.0  139.12  0.220   0.450  109  104    4.1   322  250   66 0.238  1961
 AG 1   2.0  139.74  0.140   0.290  104  103    3.0   288  245    - 0.238  1530
 AG 2   2.0  140.56  0.270   0.560  108  103    4.7   314  245    - 0.238  2161
 AG 3   2.0  141.43  0.280   0.570  110  104    4.8   315  245   66 0.238  2202
 AG 4   2.0  142.30  0.270   0.560  110  104    4.7   312  245   67 0.238  2158
 AG 5   2.0  143.21  0.320   0.650  111  104    5.0   305  245   67 0.238  2339
 AH 1   2.0  144.05  0.250   0.520  106  103    4.3   287  240    - 0.238  2043
 AH 2   2.0  144.98  0.320   0.650  109  104    5.0   293  235    - 0.238  2321
 AH 3   2.0  145.93  0.340   0.700  110  104    5.2   306  240   70 0.238  2413
 AH 4   2.0  146.86  0.310   0.630  111  104    5.0   306  240   69 0.238  2304
 AH 5   2.0  147.87  0.390   0.800  111  104    6.0   304  230   68 0.238  2581
 AI 1   2.0  148.87  0.360   0.750  106  103    5.7   269  250    - 0.238  2422
 AI 2   2.0  149.92  0.410   0.840  109  103    6.2   292  250    - 0.238  2625
 AI 3   2.0  150.95  0.410   0.840  110  104    6.2   295  245   64 0.238  2630
 AI 4   2.0  152.03  0.420   0.860  111  104    6.3   299  240   63 0.238  2669
 AI 5   2.0  153.11  0.440   0.900  112  104    6.6   297  235   66 0.238  2729
 AJ 1   2.0  154.09  0.350   0.720  102  102    5.5   281  245    - 0.238  2408
 AJ 2   2.0  155.14  0.410   0.840  106  103    6.2   285  255    - 0.238  2613
 AJ 3   2.0  156.22  0.430   0.880  108  103    6.3   295  250   63 0.238  2694
 AJ 4   2.0  157.33  0.450   0.920  109  103    6.8   295  245   62 0.238  2756
 AJ 5   2.0  158.49  0.520   1.050  110  103    7.2   288  245   62 0.238  2949
```

```
OUTPUT DATE - 08/18/80
       TIME - 11:55:41                                         KENVIRONS, INC.
                                                               PROJECT NO. 80019
------------------------------------------------------------------------------
        BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
------------------------------------------------------------------------------

              PARTICULATE AND SO2 DATA WITH CALCULATED VALUES

                              RUN - ESPB01
                              DATE- 07/17/80

ATMOS  ATMOS  STACK   H2O    PARTIC  STACK  INIT    PERC PERC PERC PITOT
TEMP   PRES   PRES    COND   WT-TTL  AREA   VOL     O2   CO2  CO   TUBE
(DG.F) (I.HG) (I.HG)  (ML)   (MG)    (IN2)  (DCF)   DRY  DRY  DRY  COEF

  95   29.61  28.50   89.5   962.90  33618  792.40  7.3 12.0  0.0 0.840

    NBACL2       VT       VTB    VSOLN     VA
     (N)        (ML)      (ML)    (ML)    (ML)

  0.01021000    24.16     0.02   1000.0    1.0


PORT- SAMP  METER    DELTA    DELTA  TEMP TEMP TRAIN STACK BOX  BATH PROBE   VEL
POINT TIME   VOL       P        H     IN   OUT  VAC   TEMP TEMP TEMP T DIA
     (MIN)  (DCF)  (I.H2O)  (I.H2O)  (F)  (F) (I.HG)  (F)  (F)  (F)  (IN)  (FPM)

BA 1   2.0  793.22  0.250    0.500   108  108   4.2   226  260   70 0.241  1957
BA 2   2.0  794.23  0.380    0.800   117  110   5.2   291  260   68 0.241  2524
BA 3   2.0  795.27  0.350    0.780   121  110   5.3   323  255   65 0.241  2473
BA 4   2.0  796.29  0.350    0.780   124  110   5.5   340  250   65 0.241  2500
BA 5   2.0  797.29  0.420    0.900   128  112   6.0   345  250   65 0.241  2747
BB 1   2.0  798.30  0.300    0.650   126  113   4.9   187  250   65 0.241  2081
BB 2   2.0  799.32  0.370    0.800   128  114   5.9   280  250   65 0.241  2472
BB 3   2.0  800.29  0.370    0.800   130  116   5.9   318  250   65 0.241  2535
BB 4   2.0  801.47  0.380    0.810   132  116   5.9   339  250   66 0.241  2603
BB 5   2.0  802.52  0.440    0.950   134  117   6.3   338  250   66 0.241  2800
BC 1   2.0  803.37  0.250    0.520   128  117   4.4   184  250   66 0.241  1896
BC 2   2.0  804.32  0.340    0.720   134  117   5.1   279  250   66 0.241  2368
BC 3   2.0  805.32  0.340    0.720   137  118   5.1   215  250   70 0.241  2263
BC 4   2.0  806.30  0.320    0.690   138  118   5.0   330  250   68 0.241  2375
BC 5   2.0  807.31  0.350    0.760   139  118   5.4   334  250   66 0.241  2491
BD 1   2.0  808.09  0.190    0.420   132  118   4.0   189  250   66 0.241  1659
BD 2   2.0  808.97  0.250    0.530   136  118   4.6   251  250   66 0.241  1992
BD 3   2.0  810.00  0.250    0.530   138  118   4.6   308  250   66 0.241  2070
BD 4   2.0  810.93  0.250    0.530   138  118   4.9   326  250   66 0.241  2094
BD 5   2.0  811.64  0.300    0.650   140  118   5.0   327  250   66 0.241  2296
BE 1   2.0  812.13  0.180    0.420   132  118   4.0   143  250   65 0.241  1556
BE 2   2.0  813.20  0.180    0.420   132  118   4.0   248  250   65 0.241  1687
BE 3   2.0  814.00  0.180    0.420   136  118   4.0   284  250   65 0.241  1729
BE 4   2.0  814.86  0.230    0.500   138  118   4.6   309  250   65 0.241  1987
BE 5   2.0  815.70  0.250    0.540   138  118   4.7   319  250   68 0.241  2085
BF 1   2.0  816.47  0.180    0.420   132  118   4.1   272  250   68 0.241  1715
BF 2   2.0  817.21  0.180    0.420   136  118   4.0   292  250   68 0.241  1738
BF 3   2.0  818.06  0.210    0.460   138  118   4.2   311  250   68 0.241  1901
```

8

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OUTPUT DATE - 08/18/80
       TIME - 11:55:41                                     KENVIRONS, INC.
                                                           PROJECT NO. 80019
------------------------------------------------------------------------------
         BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
------------------------------------------------------------------------------

PORT- SAMP  METER   DELTA    DELTA  TEMP TEMP TRAIN STACK  BOX BATH PROBE   VEL
POINT TIME   VOL      P        H     IN   OUT  VAC   TEMP TEMP TEMP T DIA
      (MIN) (DCF) (I.H2O) (I.H2O)   (F)  (F) (I.HG)  (F)  (F)  (F)  (IN)  (FPM)

BF 4   2.0  818.90  0.220   0.470   138  118   4.4   312  250   68 0.241  1947
BF 5   2.0  819.67  0.220   0.470   139  118   4.4   313  250   68 0.241  1948
BG 1   2.0  820.59  0.280   0.630   135  118   4.7   269  250   68 0.241  2135
BG 2   2.0  821.54  0.280   0.630   138  119   5.0   286  235   68 0.241  2159
BG 3   2.0  822.53  0.310   0.690   140  119   5.7   300  235   68 0.241  2293
BG 4   2.0  823.52  0.300   0.680   140  119   5.6   303  235   68 0.241  2260
BG 5   2.0  824.49  0.340   0.760   142  120   5.4   302  235   68 0.241  2405
BH 1   2.0  825.41  0.300   0.670   134  119   5.1   268  245   68 0.241  2208
BH 2   2.0  826.48  0.330   0.720   138  120   5.6   275  245   68 0.241  2327
BH 3   2.0  827.50  0.370   0.810   140  120   6.1   294  245   68 0.241  2495
BH 4   2.0  828.52  0.310   0.680   141  120   5.6   297  245   63 0.241  2289
BH 5   2.0  829.56  0.380   0.850   142  120   5.5   297  245   63 0.241  2534
BI 1   2.0  830.60  0.350   0.790   136  120   5.8   241  245   63 0.241  2340
BI 2   2.0  831.70  0.400   0.900   140  120   6.5   254  245   63 0.241  2525
BI 3   2.0  832.86  0.430   0.960   140  120   7.0   277  245   63 0.241  2660
BI 4   2.0  834.00  0.440   0.980   142  120   7.2   284  245   63 0.241  2703
BI 5   2.0  835.27  0.510   1.200   142  120   8.0   285  245   63 0.241  2912
BJ 1   2.0  836.38  0.360   0.800   136  121   6.0   268  245   63 0.241  2419
BJ 2   2.0  837.37  0.350   0.790   138  121   6.0   278  245   63 0.241  2401
BJ 3   2.0  838.64  0.460   1.100   140  121   6.3   286  245   63 0.241  2768
BJ 4   2.0  839.74  0.460   1.100   142  121   7.0   286  245   63 0.241  2768
BJ 5   2.0  841.10  0.530   1.200   143  121   8.3   286  245   63 0.241  2971
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OUTPUT DATE - 08/18/80
       TIME - 11:55:41                                          KENVIRONS, INC.
-------------------------------------------------------------   PROJECT NO. 80019
          BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
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                 PARTICULATE AND SO2 DATA WITH CALCULATED VALUES

                               RUN - STK001
                               DATE- 07/17/80

ATMOS  ATMOS  STACK   H2O    PARTIC  STACK  INIT     PERC PERC PERC PITOT
TEMP   PRES   PRES    COND   WT-TTL  AREA   VOL      O2   CO2  CO   TUBE
(DG.F) (I.HG) (I.HG)  (ML)   (MG)    (IN2)  (DCF)    DRY  DRY  DRY  COEF

 97    29.44  29.38   68.1    79.80  40828  418.66   8.8 10.4  0.2 0.840

    NBACL2       VT        VTB    VSOLN      VA
     (N)        (ML)       (ML)    (ML)     (ML)

 0.01016000      9.53      0.01   1000.0    10.0


PORT- SAMP  METER    DELTA    DELTA  TEMP TEMP TRAIN STACK BOX  BATH PROBE   VEL
POINT TIME   VOL       P        H     IN   OUT   VAC  TEMP TEMP TEMP T DIA
      (MIN) (DCF)  (I.H2O)  (I.H2O)  (F)  (F) (I.HG)  (F)  (F)  (F)  (IN)  (FPM)
A  1   3.0  419.70   0.470   0.350   110   98   3.5   166  200   68 0.172  2533
A  2   3.0  420.89   0.630   0.470   114   98   3.6   170  200   68 0.172  2942
A  3   3.0  422.29   0.900   0.660   120   99   3.8   173  200   68 0.172  3524
A  4   3.0  423.68   0.850   0.630   124   99   5.5   173  200   68 0.172  3425
A  5   3.0  425.10   0.850   0.630   125  100   4.8   172  205   69 0.172  3422
A  6   3.0  426.47   0.800   0.590   127  100   4.5   169  225   68 0.172  3312
A  7   3.0  427.83   0.800   0.590   128  101   4.5   169  250   66 0.172  3312
D  1   3.0  428.77   0.350   0.260   110  104   3.0   167  225   66 0.172  2187
D  2   3.0  429.95   0.700   0.520   123  104   4.2   170  240   68 0.172  3101
D  3   3.0  431.32   0.800   0.590   125  103   4.8   171  230   70 0.172  3318
D  4   3.0  432.70   0.800   0.590   128  103   4.5   172  327   72 0.172  3320
D  5   3.0  434.07   0.800   0.590   129  103   4.5   173  232   75 0.172  3323
D  6   3.0  435.47   0.800   0.590   130  103   4.5   174  252   72 0.172  3325
D  7   3.0  436.81   0.770   0.570   131  103   4.5   176  275   70 0.172  3268
C  1   3.0  437.97   0.530   0.390   114  105   3.5   172  300   74 0.172  2702
C  2   3.0  439.18   0.630   0.470   122  105   3.9   176  290   76 0.172  2956
C  3   3.0  440.49   0.700   0.520   127  105   4.0   175  290   77 0.172  3113
C  4   3.0  441.91   0.850   0.630   128  105   5.0   168  280   76 0.172  3412
C  5   3.0  443.29   0.800   0.590   130  105   4.8   168  290   77 0.172  3310
C  6   3.0  444.68   0.800   0.590   131  105   4.8   168  300   77 0.172  3310
C  7   3.0  446.04   0.750   0.560   132  105   4.5   168  300   74 0.172  3205
B  1   3.0  447.18   0.530   0.390   114  106   3.5   158  230   75 0.172  2672
B  2   3.0  448.38   0.600   0.440   125  105   3.8   160  225   75 0.172  2848
B  3   3.0  449.66   0.650   0.480   128  105   4.2   162  240   78 0.172  2969
B  4   3.0  450.84   0.700   0.530   128  105   4.2   166  245   78 0.172  3091
B  5   3.0  452.13   0.750   0.560   130  105   4.5   167  250   78 0.172  3202
B  6   3.0  453.48   0.750   0.560   131  105   4.5   167  260   79 0.172  3202
B  7   3.0  454.84   0.750   0.560   132  105   4.5   167  285   78 0.172  3202
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OUTPUT DATE - 08/27/80
       TIME - 14:30:51                                    KENVIRONS, INC.
                                                          PROJECT NO. 80019
---------------------------------------------------------------------------
       BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
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                 PARTICULATE AND SO2 EMISSION DATA

     NAME   DESCRIPTION                   UNITS

            TITLE OF RUN                           ESPA01     ESPB01     STK001
            DATE OF RUN                          07/17/80   07/17/80   07/17/80
            TIME OF RUN                         1428-1724  1428-1655  1422-1702
     DN     PROBE TIP DIAMETER               IN      0.238      0.241      0.172
     TT     NET TIME OF RUN                 MIN      100.0      100.0       84.0
     NP     NUMBER OF SAMPLING POINTS                   50         50         28
     Y      DRY GAS METER CALIB. FACTOR             1.0240     1.0370     1.0170
     PB     BAROMETRIC PRES, LAB          IN.HG      29.66      29.66      29.66
     PBC    BAROMETRIC PRES, CONSOLE      IN.HG      29.61      29.61      29.44
     PM     AVG ORF PRES DROP            IN.H2O      0.580      0.706      0.532
     VM     VOL DRY GAS-METER COND          DCF      42.60      48.70      36.18
     TM     AVG GAS METER TEMP            DEG.F      104.8      126.4      114.0
     VMSTD  VOL DRY GAS-STD COND           DSCF      40.41      45.07      33.34
     VW     TOTAL H2O COLLECTED              ML       81.1       89.5       68.1
     VWV    VOL H2O VAPOR-STD COND          SCF       3.82       4.21       3.21
     PMOS   PERCENT MOISTURE BY VOLUME                 8.6        8.5        8.8
     MD     MOLE FRACTION DRY GAS                    0.914      0.915      0.912
     PCO2   PERCENT CO2 BY VOLUME, DRY                12.0       12.0       10.4
     PO2    PERCENT O2 BY VOLUME, DRY                  7.7        7.3        8.8
     PCO    PERCENT CO BY VOLUME, DRY                  0.0        0.0        0.2
     PN2    PERCENT N2 BY VOLUME, DRY                 80.3       80.7       80.6
     MWD    MOLECULAR WT-DRY STK GAS                 30.23      30.21      30.02
     MW     MOLECULAR WT-STK GAS                     29.17      29.17      28.96
     CP     PITOT TUBE COEFFICIENT                   0.840      0.840      0.840
     DPS    AVG SQRT STK VEL HEAD        IN.H2O      0.522      0.560      0.844
     TS     AVG STACK TEMPERATURE         DEG.F      300.1      283.4      169.2
     PS     STACK PRESSURE, ABSOLUTE      IN.HG      28.46      28.50      29.38
     VS     AVG STACK GAS VELOCITY          FPM       2150       2280       3120
     AS     STACK AREA                      IN2      33618      33618      40828
     QS     STK FLOWRATE, DRY, STD        DSCFM     303000     329000     666000
     QA     ACTUAL STACK FLOWRATE          ACFM     502000     532000     886000
     PERI   PERCENT ISOKINETIC                       100.7      100.9      104.7
     MT     PARTICULATE WT-TOTAL             MG     628.70     962.90      79.80
     CAN    PART. LOAD-TTL, STD         GR/DSCF      0.240      0.330      0.037
     C      PART. LOAD-TTL, STD         LB/DSCF  .00003430  .00004710  .00000527
     CAT    PART. LOAD-TTL, STK          GR/ACF      0.145      0.204      0.028
     CAW    PART. EMIS-TOTAL              LB/HR   624.0000   930.0000   211.0000
     E      EMISSION RATE              LB/MMBTU     0.5320     0.7120     0.0895
     F      F FACTOR                 DSCF/MMBTU       9820       9820       9820
     SCONC  SO2, CONC., STD             LB/DSCF  3.86E-04   3.86E-04   2.05E-05
     SCONCA SO2, CONC., STK              LB/ACF  2.33E-04   2.39E-04   1.54E-05
     SCHR   SO2 EMISSION RATE             LB/HR   7028.138   7627.597    819.000
     SCMM   SO2 EMISSION RATE          LB/MMBTU      5.990      5.840      0.348
     SCPPM  SO2, CONC., STD                 PPM       2330       2330        124
     SCPPMA SO2, CONC., STK                 PPM       2130       2130        113
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OUTPUT DATE - 08/18/80
       TIME - 11:56:52                                          KENVIRONS, INC.
----------------------------------------------------------     PROJECT NO. 80019
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         BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
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              PARTICULATE AND SO2 DATA WITH CALCULATED VALUES

                              RUN - ESPA02
                              DATE- 07/18/80

ATMOS  ATMOS  STACK   H2O   PARTIC  STACK   INIT   PERC PERC PERC PITOT
TEMP   PRES   PRES    COND  WT-TTL  AREA    VOL    O2   CO2  CO   TUBE
(DG.F) (I.HG) (I.HG)  (ML)  (MG)    (IN2)   (DCF)  DRY  DRY  DRY  COEF

  95   29.75  28.64   91.6  822.10  33618  166.67  7.5 12.0  0.0 0.840

     NBACL2      VT       VTD    VSOLN     VA
      (N)       (ML)      (ML)    (ML)    (ML)

  0.01021000    20.89     0.02   1000.0    1.0


PORT- SAMP  METER   DELTA   DELTA TEMP TEMP TRAIN STACK BOX BATH PROBE   VEL
POINT TIME  VOL       P       H    IN   OUT  VAC  TEMP TEMP TEMP T DIA
      (MIN) (DCF) (I.H2O) (I.H2O) (F)  (F) (I.HG)  (F)  (F)  (F)  (IN)  (FPM)
AJ 1   2.0  167.75  0.420  0.850   97   96   6.0   269  270    - 0.238  2612
AJ 2   2.0  168.86  0.500  1.000  100   97   7.0   280  270    - 0.238  2871
AJ 3   2.0  170.00  0.500  1.000  102   98   7.0   288  270   60 0.238  2886
AJ 4   2.0  171.13  0.490  0.990  104   98   6.9   292  265   60 0.238  2865
AJ 5   2.0  172.35  0.600  1.200  106   99   8.0   288  265   60 0.238  3162
AI 1   2.0  173.37  0.390  0.800   97   96   5.9   270  255    - 0.238  2518
AI 2   2.0  174.46  0.470  0.960  101   98   6.6   301  250    - 0.238  2823
AI 3   2.0  175.56  0.470  0.960  104   98   6.6   304  255   58 0.238  2828
AI 4   2.0  176.68  0.470  0.960  105   99   6.7   306  250   58 0.238  2832
AI 5   2.0  177.87  0.560  1.150  107  100   7.6   306  255   59 0.238  3091
AH 1   2.0  178.73  0.280  0.570   98  101   4.8   270  255    - 0.238  2134
AH 2   2.0  179.65  0.330  0.670  105   99   5.0   308  255    - 0.238  2376
AH 3   2.0  180.63  0.380  0.770  107   99   5.6   313  255   64 0.238  2558
AH 4   2.0  181.57  0.330  0.670  107   99   5.1   313  255   62 0.238  2384
AH 5   2.0  182.58  0.400  0.810  108  100   5.9   316  260   61 0.238  2630
AG 1   2.0  183.23  0.150  0.310  101   99   5.3   276  250    - 0.238  1568
AG 2   2.0  184.07  0.290  0.590  105  100   4.8   314  250    - 0.238  2236
AG 3   2.0  184.96  0.300  0.600  107  100   4.9   323  250   64 0.238  2288
AG 4   2.0  185.86  0.300  0.600  108  101   4.9   322  250   62 0.238  2286
AG 5   2.0  186.85  0.380  0.770  109  101   5.8   316  255   61 0.238  2563
AF 1   2.0  187.30  0.080  0.160  101  101   2.4   301  250    - 0.238  1165
AF 2   2.0  187.83  0.110  0.220  104  102   2.9   308  245    - 0.238  1372
AF 3   2.0  188.30  0.080  0.160  104  102   2.4   328  250   68 0.238  1185
AF 4   2.0  189.03  0.220  0.450  107  102   4.1   331  250   67 0.238  1969
AF 5   2.0  189.82  0.230  0.470  108  102   4.2   333  250   66 0.238  2016
AE 1   2.0  190.23  0.060  0.130  101  101   2.2   189  250    - 0.238   931
AE 2   2.0  190.54  0.030  0.060  102  102   0.0   317  250    - 0.238   721
AE 3   2.0  190.97  0.080  0.160  103  103   2.3   329  250   72 0.238  1186
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OUTPUT DATE - 08/18/80
       TIME - 11:56:53                                        KENVIRONS, INC.  2.2
                                                              PROJECT NO. 80019
-------------------------------------------------------------------------------
       BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
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PORT- SAMP  METER     DELTA     DELTA  TEMP TEMP  TRAIN STACK  BOX BATH PROBE    VEL
POINT TIME   VOL        P         H     IN   OUT   VAC  TEMP TEMP TEMP T DIA
      (MIN) (DCF)  (I.H2O)  (I.H2O)   (F)  (F) (I.HG)   (F)  (F)  (F)  (IN)  (FPM)

AE 4   2.0  191.67   0.190    0.390   107  103    3.8   340  255   68 0.238   1840
AE 5   2.0  192.42   0.220    0.440   109  104    4.0   340  255   63 0.238   1980
AD 1   2.0  193.06   0.150    0.300   104  103    3.2   307  255    - 0.238   1601
AD 2   2.0  193.86   0.240    0.490   108  103    4.2   317  255    - 0.238   2038
AD 3   2.0  194.70   0.280    0.560   109  103    4.6   345  250   66 0.238   2241
AD 4   2.0  195.54   0.270    0.520   110  103    4.4   343  255   64 0.238   2198
AD 5   2.0  196.40   0.300    0.570   110  103    4.8   330  260   63 0.238   2298
AC 1   2.0  197.18   0.210    0.450   105  102    4.1   215  260    - 0.238   1777
AC 2   2.0  198.08   0.330    0.670   109  103    5.3   315  260    - 0.238   2387
AC 3   2.0  199.05   0.350    0.720   111  103    5.8   340  260   68 0.238   2497
AC 4   2.0  199.96   0.320    0.610   111  104    5.1   345  260   66 0.238   2396
AC 5   2.0  200.90   0.360    0.690   112  104    5.7   351  260   66 0.238   2550
AB 1   2.0  201.75   0.250    0.540   107  103    4.8   250  260    - 0.238   1988
AB 2   2.0  202.79   0.450    0.910   112  104    6.9   311  265    - 0.238   2780
AB 3   2.0  203.83   0.440    0.840   113  105    6.6   338  265   58 0.238   2797
AB 4   2.0  204.82   0.380    0.720   113  105    5.9   348  265   59 0.238   2615
AB 5   2.0  205.87   0.450    0.870   114  105    6.8   348  265   60 0.238   2846
AA 1   2.0  206.68   0.240    0.490   107  105    4.8   305  250    - 0.238   2022
AA 2   2.0  207.71   0.400    0.810   112  105    6.5   328  250    - 0.238   2650
AA 3   2.0  208.70   0.370    0.750   114  106    7.3   346  250   62 0.238   2577
AA 4   2.0  209.70   0.390    0.740   114  106    6.1   349  250   63 0.238   2651
AA 5   2.0  210.78   0.460    0.890   115  106    7.2   352  255   63 0.238   2885
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OUTPUT DATE - 08/18/80
       TIME - 11:56:53                                              KENVIRONS, INC.
                                                                    PROJECT NO. 80019
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       BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
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                 PARTICULATE AND SO2 DATA WITH CALCULATED VALUES

                              RUN - ESPB02
                              DATE- 07/18/80

ATMOS  ATMOS  STACK   H2O    PARTIC  STACK   INIT    PERC PERC PERC PITOT
TEMP   PRES   PRES    COND   WT-TTL  AREA    VOL     O2   CO2  CO   TUBE
(DG.F) (I.HG) (I.HG)  (ML)   (MG)    (IN2)   (DCF)   DRY  DRY  DRY  COEF

 105   29.75  28.64   93.9   482.50  33618   848.14  6.8  12.3  0.0 0.840

     NBACL2       VT        VTB     VSOLN     VA
      (N)        (ML)       (ML)     (ML)     (ML)

  0.01021000     21.45      0.02    1000.0    1.0


PORT- SAMP  METER    DELTA    DELTA  TEMP TEMP TRAIN  STACK BOX  BATH PROBE   VEL
POINT TIME  VOL      P        H      IN   OUT  VAC    TEMP  TEMP TEMP T DIA
      (MIN) (DCF)  (I.H2O)  (I.H2O)  (F)  (F)  (I.HG)  (F)   (F)  (F)  (IN)  (FPM)

BA 1   2.0  849.12  0.310   0.790   104  101    4.3   272   230   65 0.241  2248
BA 2   2.0  850.20  0.350   0.870   111  101    4.7   319   238   65 0.241  2464
BA 3   2.0  851.27  0.350   0.850   114  101    4.6   339   242   65 0.241  2495
BA 4   2.0  852.30  0.350   0.850   118  101    4.6   346   240   65 0.241  2506
BA 5   2.0  853.41  0.380   0.920   120  102    5.0   346   240   60 0.241  2611
BB 1   2.0  854.39  0.320   0.760   118  104    4.0   222   245   60 0.241  2204
BB 2   2.0  855.31  0.300   0.720   121  104    4.3   227   245   60 0.241  2142
BB 3   2.0  856.34  0.340   0.810   124  104    4.7   316   240   60 0.241  2424
BB 4   2.0  857.43  0.330   0.800   126  105    4.7   340   240   60 0.241  2424
BB 5   2.0  858.57  0.380   0.920   128  106    5.1   345   240   60 0.241  2610
BC 1   2.0  859.50  0.250   0.600   122  108    3.9   273   240   60 0.241  2020
BC 2   2.0  860.50  0.280   0.680   128  108    4.4   294   240   60 0.241  2168
BC 3   2.0  861.47  0.280   0.680   131  108    4.2   330   215   60 0.241  2219
BC 4   2.0  862.30  0.280   0.680   122  112    4.2   304   255   60 0.241  2182
BC 5   2.0  863.37  0.310   0.740   128  112    4.6   332   255   68 0.241  2338
BD 1   2.0  864.17  0.180   0.480   126  113    3.8   280   275   67 0.241  1722
BD 2   2.0  865.00  0.200   0.490   128  113    3.9   320   275   67 0.241  1864
BD 3   2.0  865.91  0.220   0.530   132  114    4.0   335   275   67 0.241  1973
BD 4   2.0  866.79  0.220   0.530   135  114    4.0   341   260   67 0.241  1981
BD 5   2.0  867.64  0.250   0.600   137  114    4.0   343   260   67 0.241  2114
BE 1   2.0  868.07  0.070   0.170   128  116    2.4   267   250   66 0.241  1064
BE 2   2.0  868.71  0.120   0.290   132  116    3.0   286   250   66 0.241  1412
BE 3   2.0  869.34  0.120   0.290   134  117    3.0   317   250   66 0.241  1441
BE 4   2.0  877.05  0.150   0.360   136  117    3.0   333   250   66 0.241  1627
BE 5   2.0  870.78  0.170   0.400   135  118    3.5   333   250   60 0.241  1733
BF 1   2.0  871.26  0.080   0.190   132  118    2.4   264   260   60 0.241  1136
BF 2   2.0  871.87  0.120   0.290   135  119    3.0   278   260   60 0.241  1404
BF 3   2.0  872.56  0.140   0.340   140  119    3.1   318   265   60 0.241  1557
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OUTPUT DATE - 08/18/80
       TIME - 11:56:54                                    KENVIRONS, INC.
                                                          PROJECT NO. 80019
---------------------------------------------------------------------------
         BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
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PORT- SAMP  METER    DELTA    DELTA  TEMP TEMP  TRAIN STACK  BOX BATH PROBE   VEL
POINT TIME   VOL       P        H     IN   OUT   VAC   TEMP TEMP TEMP T DIA
      (MIN) (DCF)  (I.H2O)  (I.H2O)  (F)  (F)  (I.HG)  (F)  (F)  (F)  (IN) (FPM)

BF 4   2.0  873.31   0.160    0.370  141  120    3.3   324  265   60 0.241  1671
BF 5   2.0  874.12   0.180    0.420  142  120    3.5   328  265   60 0.241  1777
BG 1   2.0  874.92   0.210    0.500  138  122    3.7   287  265   60 0.241  1869
BG 2   2.0  875.80   0.200    0.480  140  122    3.9   297  265   60 0.241  1836
BG 3   2.0  876.69   0.230    0.550  143  122    4.0   318  265   60 0.241  1996
BG 4   2.0  877.54   0.210    0.500  144  122    3.9   317  265   60 0.241  1906
BG 5   2.0  878.42   0.250    0.600  145  122    4.1   318  265   60 0.241  2081
BH 1   2.0  879.30   0.210    0.500  140  123    3.8   231  265   60 0.241  1797
BH 2   2.0  880.21   0.280    0.670  143  124    4.3   267  265   60 0.241  2129
BH 3   2.0  881.34   0.310    0.730  146  124    4.7   308  250   60 0.241  2302
BH 4   2.0  882.19   0.210    0.500  146  124    3.9   310  250   60 0.241  1897
BH 5   2.0  883.16   0.310    0.750  148  124    4.7   310  250   60 0.241  2305
BI 1   2.0  884.19   0.320    0.760  142  124    4.7   279  250   60 0.241  2295
BI 2   2.0  885.30   0.350    0.840  145  124    4.9   294  250   60 0.241  2424
BI 3   2.0  886.30   0.380    0.900  146  124    5.3   301  250   60 0.241  2537
BI 4   2.0  887.42   0.380    0.900  148  124    5.2   303  250   60 0.241  2541
BI 5   2.0  888.65   0.450    1.100  148  124    5.9   302  250   60 0.241  2763
BJ 1   2.0  889.60   0.300    0.720  138  124    4.6   277  250   60 0.241  2219
BJ 2   2.0  890.60   0.380    0.910  143  125    5.3   303  250   60 0.241  2541
BJ 3   2.0  891.74   0.400    0.960  146  125    5.4   304  250   60 0.241  2608
BJ 4   2.0  893.00   0.400    0.960  147  125    5.4   303  250   60 0.241  2607
BJ 5   2.0  894.13   0.460    1.100  148  125    6.0   302  250   60 0.241  2794
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OUTPUT DATE - 08/18/80
       TIME - 11:56:54
                                                                KENVIRONS, INC.
----------------------------------------------------------------PROJECT NO. 80019
        BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
---------------------------------------------------------------------------------

                PARTICULATE AND SO2 DATA WITH CALCULATED VALUES

                              RUN - STK002
                              DATE- 07/18/80

ATMOS  ATMOS  STACK   H2O    PARTIC  STACK   INIT    PERC PERC PERC PITOT
TEMP   PRES   PRES    COND   WT-TTL  AREA    VOL     O2   CO2  CO   TUBE
(DG.F) (I.HG) (I.HG)  (ML)   (MG)    (IN2)   (DCF)   DRY  DRY  DRY  COEF

 94    29.58  29.52  131.5    90.90  40828  463.02   8.3 10.8  0.0 0.840

    NBACL2       VT        VTB    VSOLN     VA
     (N)        (ML)       (ML)    (ML)    (ML)

 0.01016000    13.27      0.01   1000.0   10.0


PORT- SAMP  METER   DELTA   DELTA  TEMP TEMP TRAIN STACK BOX  BATH PROBE   VEL
POINT TIME   VOL      P       H     IN   OUT  VAC  TEMP  TEMP TEMP T DIA
      (MIN) (DCF)  (I.H2O) (I.H2O) (F)  (F)  (I.HG) (F)  (F)  (F)   (IN)  (FPM)

A  1   3.0  464.09  0.500   0.360  101   94   4.5  171   285   74 0.172  2649
A  2   3.0  465.35  0.730   0.530  113   94   5.2  176   290   67 0.172  3214
A  3   3.0  466.76  0.870   0.640  117   94   6.0  176   270   65 0.172  3508
A  4   3.0  468.23  0.960   0.700  120   95   6.7  177   245   62 0.172  3688
A  5   3.0  469.66  0.870   0.640  121   96   6.2  177   245   62 0.172  3511
A  6   3.0  471.07  0.870   0.640  122   96   6.2  177   225   62 0.172  3511
A  7   3.0  472.50  0.870   0.640  124   97   6.2  177   240   62 0.172  3511
D  1   3.0  473.65  0.530   0.390  114  100   4.8  168   248   72 0.172  2721
D  2   3.0  474.89  0.700   0.510  122  100   5.2  174   280   68 0.172  3142
D  3   3.0  476.33  0.900   0.650  125   99   6.5  175   290   67 0.172  3565
D  4   3.0  477.74  0.830   0.610  125   99   6.2  176   280   68 0.172  3427
D  5   3.0  479.14  0.830   0.610  127  100   6.2  176   280   68 0.172  3427
D  6   3.0  480.65  0.830   0.610  128  100   6.2  176   260   68 0.172  3427
D  7   3.0  481.92  0.830   0.610  128  100   6.2  177   250   68 0.172  3429
C  1   3.0  483.06  0.530   0.390  118  104   4.8  172   300   72 0.172  2730
C  2   3.0  484.26  0.650   0.470  124  103   5.1  171   280   72 0.172  3021
C  3   3.0  485.66  0.870   0.630  128  103   6.2  169   275   71 0.172  3489
C  4   3.0  487.08  0.870   0.630  128  103   6.2  167   275   70 0.172  3483
C  5   3.0  488.51  0.870   0.630  130  103   6.2  168   275   70 0.172  3486
C  6   3.0  489.93  0.870   0.630  130  103   6.2  170   275   70 0.172  3492
C  7   3.0  491.36  0.870   0.630  130  103   6.2  178   280   68 0.172  3514
B  1   3.0  492.51  0.530   0.390  128  105   4.8  175   250   70 0.172  2736
B  2   3.0  493.72  0.650   0.470  126  105   5.0  178   235   70 0.172  3037
B  3   3.0  495.12  0.870   0.630  128  105   6.0  178   235   68 0.172  3514
B  4   3.0  496.55  0.870   0.630  129  104   6.2  179   225   68 0.172  3517
B  5   3.0  497.97  0.870   0.630  130  104   6.2  180   239   66 0.172  3519
B  6   3.0  499.41  0.870   0.630  131  104   6.2  180   270   68 0.172  3519
B  7   3.0  500.85  0.870   0.630  131  104   6.2  181   280   70 0.172  3522
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OUTPUT DATE - 08/27/80
       TIME - 14:31:50                                  KENVIRONS, INC.
                                                        PROJECT NO. 80019
-------------------------------------------------------------------------------
      BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
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                   PARTICULATE AND SO2 EMISSION DATA

NAME    DESCRIPTION                  UNITS

        TITLE OF RUN                            ESPA02     ESPB02     STK002
        DATE OF RUN                           07/18/80   07/18/80   07/18/80
        TIME OF RUN                          1100-1338  1115-1342  1100-1301
DN      PROBE TIP DIAMETER              IN       0.238      0.241      0.172
TT      NET TIME OF RUN                MIN       100.0      100.0       84.0
NP      NUMBER OF SAMPLING POINTS                   50         50         28
Y       DRY GAS METER CALIB. FACTOR             1.0250     1.0360     1.0175
PB      BAROMETRIC PRES, LAB         IN.HG       29.80      29.80      29.80
PBC     BAROMETRIC PRES, CONSOLE     IN.HG       29.75      29.75      29.58
PM      AVG ORF PRES DROP           IN.H2O       0.640      0.647      0.577
VM      VOL DRY GAS-METER COND         DCF       44.11      45.99      37.82
TM      AVG GAS METER TEMP           DEG.F       104.1      125.1      112.4
VMSTD   VOL DRY GAS-STD COND          DSCF       42.14      42.81      35.14
VW      TOTAL H2O COLLECTED             ML        91.6       93.9      131.5
VWV     VOL H2O VAPOR-STD COND         SCF        4.31       4.42       6.19
PMOS    PERCENT MOISTURE BY VOLUME                 9.3        9.4       15.0
MD      MOLE FRACTION DRY GAS                    0.907      0.906      0.850
PCO2    PERCENT CO2 BY VOLUME, DRY                12.0       12.3       10.8
PO2     PERCENT O2 BY VOLUME, DRY                  7.5        6.8        8.3
PCO     PERCENT CO BY VOLUME, DRY                  0.0        0.0        0.0
PN2     PERCENT N2 BY VOLUME, DRY                 80.5       80.8       80.8
MWD     MOLECULAR WT-DRY STK GAS                 30.22      30.25      30.06
MW      MOLECULAR WT-STK GAS                     29.09      29.10      28.26
CP      PITOT TUBE COEFFICIENT                   0.840      0.840      0.840
DPS     AVG SQRT STK VEL HEAD       IN.H2O       0.548      0.509      0.887
TS      AVG STACK TEMPERATURE        DEG.F       311.5      304.1      175.0
PS      STACK PRESSURE, ABSOLUTE     IN.HG       28.64      28.64      29.52
VS      AVG STACK GAS VELOCITY         FPM        2270       2100       3330
AS      STACK AREA                     IN2       33618      33618      40828
QS      STK FLOWRATE, DRY, STD       DSCFM      315000     294000     659000
QA      ACTUAL STACK FLOWRATE         ACFM      530000     490000     945000
PERI    PERCENT ISOKINETIC                       101.0      107.4      111.6
MT      PARTICULATE WT-TOTAL            MG      822.10     482.50      90.90
CAN     PART. LOAD-TTL, STD        GR/DSCF       0.301      0.174      0.040
C       PART. LOAD-TTL, STD        LB/DSCF  .00004300  .00002480  .00000570
CAT     PART. LOAD-TTL, STK         GR/ACF       0.179      0.104      0.028
CAW     PART. EMIS-TOTAL             LB/HR    813.0000   438.0000   225.0000
E       EMISSION RATE             LB/MMBTU      0.6590     0.3620     0.0932
F       F FACTOR                DSCF/MMBTU        9820       9820       9820
SCONC   SO2, CONC., STD            LB/DSCF   3.57E-04   3.61E-04   2.71E-05
SCONCA  SO2, CONC., STK             LB/ACF   2.12E-04   2.16E-04   1.89E-05
SCHR    SO2 EMISSION RATE            LB/HR   6752.409   6359.639   1069.728
SCMM    SO2 EMISSION RATE         LB/MMBTU      5.470      5.260      0.442
SCPPM   SO2, CONC., STD                PPM       2150       2180        163
SCPPMA  SO2, CONC., STK                PPM       1950       1970        139
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OUTPUT DATE - 08/18/80
       TIME - 11:57:26                                        KENVIRONS, INC.
----------------------------------------------------------   PROJECT NO. 80019
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         BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
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                 PARTICULATE AND SO2 DATA WITH CALCULATED VALUES

                              RUN - ESPA03
                              DATE- 07/19/80

ATMOS  ATMOS  STACK   H2O   PARTIC  STACK  INIT   PERC PERC PERC PITOT
TEMP   PRES   PRES    COND  WT-TTL  AREA   VOL    O2   CO2  CO   TUBE
(DG.F) (I.HG) (I.HG)  (ML)  (MG)    (IN2)  (DCF)  DRY  DRY  DRY  COEF

 95    29.81  28.69   97.9  1194.70 33618  223.30 7.8  11.5 0.0  0.840

   NBACL2      VT       VTB    VSOLN     VA
    (N)       (ML)      (ML)    (ML)    (ML)

 0.01021000   22.10     0.03   1000.0    1.0


PORT- SAMP  METER   DELTA    DELTA   TEMP TEMP TRAIN  STACK BOX  BATH PROBE    VEL
POINT TIME   VOL      P        H      IN  OUT   VAC   TEMP  TEMP TEMP T DIA
      (MIN) (DCF)  (I.H2O)  (I.H2O)  (F)  (F)  (I.HG)  (F)  (F)  (F)  (IN)   (FPM)

AA 1   2.0  224.09  0.220    0.440   101   97   4.0   284   265   -  0.238   1911
AA 2   2.0  225.10  0.400    0.800   106   98   5.2   318   265   -  0.238   2635
AA 3   2.0  226.07  0.340    0.680   108   98   4.9   344   260  62  0.238   2470
AA 4   2.0  227.05  0.370    0.700   110  100   5.0   351   260  62  0.238   2588
AA 5   2.0  228.10  0.440    0.840   111  100   5.6   354   260  61  0.238   2827
AB 1   2.0  228.91  0.240    0.480   106  101   3.9   264   260   -  0.238   1969
AB 2   2.0  229.99  0.450    0.910   112  101   6.0   304   260   -  0.238   2770
AB 3   2.0  231.06  0.440    0.840   113  102   5.7   342   260  62  0.238   2806
AB 4   2.0  232.06  0.380    0.720   114  103   5.1   353   260  61  0.238   2626
AB 5   2.0  233.13  0.460    0.860   115  104   5.9   351   265  62  0.238   2885
AC 1   2.0  233.97  0.220    0.520   109  104   4.1   141   270   -  0.238   1718
AC 2   2.0  234.92  0.340    0.690   112  104   5.0   305   265   -  0.238   2409
AC 3   2.0  235.86  0.340    0.640   113  105   4.8   338   260  64  0.238   2461
AC 4   2.0  236.75  0.300    0.560   113  105   4.4   345   265  64  0.238   2321
AC 5   2.0  237.69  0.350    0.660   114  105   5.0   353   270  64  0.238   2520
AD 1   2.0  238.36  0.150    0.320   107  104   3.2   210   275   -  0.238   1498
AD 2   2.0  239.17  0.260    0.530   111  104   4.2   309   275   -  0.238   2112
AD 3   2.0  240.03  0.280    0.530   112  105   4.2   342   270  68  0.238   2239
AD 4   2.0  240.87  0.300    0.560   113  105   4.2   343   275  66  0.238   2319
AD 5   2.0  241.74  0.310    0.580   113  105   4.5   331   275  67  0.238   2339
AE 1   2.0  242.20  0.070    0.150   105  104   2.2   243   280   -  0.238   1048
AE 2   2.0  242.66  0.070    0.140   107  105   2.2   316   275   -  0.238   1101
AE 3   2.0  243.21  0.110    0.220   108  105   2.9   326   270  72  0.238   1389
AE 4   2.0  243.90  0.190    0.360   111  106   3.6   337   265  72  0.238   1838
AE 5   2.0  244.64  0.220    0.410   111  106   3.8   334   270  71  0.238   1974
AF 1   2.0  245.20  0.100    0.220   106  105   2.8   210   275   -  0.238   1223
AF 2   2.0  245.74  0.100    0.200   107  105   2.8   315   270   -  0.238   1315
AF 3   2.0  246.26  0.090    0.180   107  105   2.6   323   270  80  0.238   1254
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OUTPUT DATE - 08/18/80
       TIME - 11:57:26                                        KENVIRONS, INC.
-------------------------------------------------------------PROJECT NO. 80019
         BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
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PORT- SAMP  METER   DELTA    DELTA  TEMP TEMP TRAIN  STACK BOX  BATH PROBE
POINT TIME   VOL      P        H     IN  OUT   VAC   TEMP  TEMP TEMP T DIA   VEL
      (MIN) (DCF) (I.H2O)  (I.H2O)  (F)  (F) (I.HG)  (F)   (F)  (F)  (IN)  (FPM)
AF 4   2.0 247.02  0.240    0.490   110  105   4.2   325   265   77 0.238  2050
AF 5   2.0 247.90  0.280    0.570   112  105   4.8   327   275   70 0.238  2218
AG 1   2.0 248.57  0.160    0.320   106  104   3.2   295   260    - 0.238  1642
AG 2   2.0 249.45  0.300    0.600   110  104   4.9   309   255    - 0.238  2269
AG 3   2.0 250.37  0.310    0.620   112  104   5.0   323   255   68 0.238  2327
AG 4   2.0 251.29  0.310    0.620   112  104   5.0   320   255   66 0.238  2323
AG 5   2.0 252.29  0.370    0.750   113  104   5.8   315   260   65 0.238  2530
AH 1   2.0 253.28  0.330    0.720   107  103   5.5   251   250    - 0.238  2288
AH 2   2.0 254.27  0.370    0.750   111  103   5.9   312   250    - 0.238  2525
AH 3   2.0 255.32  0.400    0.810   112  104   6.1   317   250   66 0.238  2634
AH 4   2.0 256.31  0.350    0.720   112  104   5.8   316   250   65 0.238  2462
AH 5   2.0 257.40  0.470    0.950   113  104   8.8   314   255   65 0.238  2849
AI 1   2.0 258.51  0.440    0.900   108  103   6.5   285   255    - 0.238  2705
AI 2   2.0 259.60  0.450    0.920   111  104  10.5   301   260    - 0.238  2764
AI 3   2.0 260.74  0.490    0.970   112  105  13.0   303   255   64 0.238  2888
AI 4   2.0 261.87  0.500    1.000   112  104  14.5   305   255   64 0.238  2922
AI 5   2.0 263.09  0.550    1.100   112  105  15.0   304   260   64 0.238  3062
AJ 1   2.0 264.20  0.440    0.900   106  103   6.7   277   265    - 0.238  2690
AJ 2   2.0 265.37  0.520    1.050   111  104   7.5   292   265    - 0.238  2954
AJ 3   2.0 266.52  0.480    0.970   114  105   7.1   297   265   64 0.238  2848
AJ 4   2.0 267.67  0.480    0.970   115  105   7.1   370   260   62 0.238  2982
AJ 5   2.0 268.89  0.580    1.150   116  106   8.2   340   265   62 0.238  3218
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OUTPUT DATE - 08/18/80
       TIME - 11:57:27                                      KENVIRONS, INC.
                                                            PROJECT NO. 80019
-------------------------------------------------------------------------------
       BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LOSE CANE RUN NO.6
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             PARTICULATE AND SO2 DATA WITH CALCULATED VALUES

                              RUN - ESPB03
                              DATE- 07/19/80

ATMOS  ATMOS   STACK   H2O    PARTIC   STACK   INIT    PERC PERC PERC PITOT
TEMP   PRES    PRES    COND   WT-TTL   AREA    VOL     O2   CO2  CO   TUBE
(DG.F) (I.HG)  (I.HG)  (ML)   (MG)     (IN2)   (DCF)   DRY  DRY  DRY  COEF

 105   29.81   28.70   94.9  1515.90   33618  901.70   7.8  11.8  0.0 0.840

    NBACL2       VT        VTB    VSOLN     VA
     (N)        (ML)      (ML)    (ML)     (ML)

  0.01021000    25.63     0.03   1000.0    1.0


PORT- SAMP  METER   DELTA    DELTA  TEMP TEMP TRAIN STACK BOX BATH PROBE   VEL
POINT TIME  VOL       P        H     IN  OUT   VAC  TEMP TEMP TEMP T DIA
      (MIN) (DCF) (I.H2O) (I.H2O)   (F)  (F) (I.HG)  (F)  (F)  (F)  (IN) (FPM)

BA 1   2.0  902.78  0.370  0.880    95   92    5.1   289  280   68 0.241  2479
BA 2   2.0  904.00  0.410  0.970   101   92    5.3   329  280   68 0.241  2678
BA 3   2.0  905.01  0.410  0.970   102   92    5.3   341  280   68 0.241  2698
BA 4   2.0  906.13  0.410  0.970   106   94    5.3   353  280   65 0.241  2719
BA 5   2.0  907.22  0.450  1.000   108   94    5.4   353  280   65 0.241  2848
BB 1   2.0  908.19  0.390  0.920   110   95    5.1   301  280   65 0.241  2565
BB 2   2.0  909.38  0.370  0.880   114   98    5.0   319  280   65 0.241  2528
BB 3   2.0  910.40  0.390  0.920   116   98    5.0   331  280   65 0.241  2615
BB 4   2.0  911.59  0.370  0.880   119   98    5.1   352  280   65 0.241  2581
BB 5   2.0  912.68  0.440  1.100   122   99    6.1   355  270   63 0.241  2820
BC 1   2.0  913.67  0.300  0.710   116  100    4.6   259  265   63 0.241  2187
BC 2   2.0  914.70  0.350  0.830   122  101    5.0   288  270   63 0.241  2409
BC 3   2.0  915.71  0.320  0.760   124  102    5.0   333  270   63 0.241  2372
BC 4   2.0  916.74  0.340  0.800   126  102    5.1   345  270   63 0.241  2463
BC 5   2.0  917.76  0.350  0.830   128  103    5.1   351  270   63 0.241  2509
BD 1   2.0  918.62  0.240  0.560   118  106    4.1   263  290   63 0.241  1961
BD 2   2.0  919.50  0.260  0.600   120  106    4.2   278  290   63 0.241  2063
BD 3   2.0  920.50  0.280  0.650   127  106    4.5   317  290   68 0.241  2196
BD 4   2.0  921.44  0.280  0.650   128  108    4.5   337  290   68 0.241  2224
BD 5   2.0  922.40  0.300  0.710   130  108    4.7   338  285   64 0.241  2304
BE 1   2.0  923.17  0.180  0.420   122  108    3.7   252  285   63 0.241  1686
BE 2   2.0  923.95  0.180  0.420   124  108    3.6   250  285   63 0.241  1683
BE 3   2.0  924.76  0.180  0.420   128  108    3.7   293  285   63 0.241  1733
BE 4   2.0  925.57  0.220  0.520   130  108    3.9   319  285   63 0.241  1949
BE 5   2.0  926.44  0.250  0.600   132  108    4.0   325  285   63 0.241  2086
BF 1   2.0  927.14  0.150  0.350   127  109    4.0   215  285   63 0.241  1498
BF 2   2.0  927.97  0.210  0.500   129  110    4.0   235  285   63 0.241  1799
BF 3   2.0  928.86  0.210  0.500   130  110    4.0   302  285   65 0.241  1884
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OUTPUT DATE - 08/18/80
       TIME - 11:57:27                                     KENVIRONS, INC.
-------------------------------------------------------------------------
                                                          PROJECT NO. 80019
         BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
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PORT- SAMP   METER    DELTA    DELTA  TEMP  TEMP  TRAIN  STACK  BOX  BATH  PROBE    VEL
POINT TIME    VOL       P        H     IN    OUT   VAC    TEMP  TEMP  TEMP  T DIA
      (MIN)  (DCF) (I.H2O)  (I.H2O)  (F)   (F)  (I.HG)   (F)   (F)   (F)   (IN)  (FPM)

BF 4   2.0  929.73   0.240   0.580   132   110    4.3    317   285    65  0.241   2033
BF 5   2.0  930.65   0.260   0.620   134   110    4.5    318   285    65  0.241   2118
BG 1   2.0  931.61   0.270   0.640   128   112    4.3    213   285    65  0.241   2007
BG 2   2.0  932.57   0.270   0.640   132   112    4.7    244   285    65  0.241   2053
BG 3   2.0  933.59   0.320   0.750   134   112    5.0    302   285    65  0.241   2325
BG 4   2.0  934.50   0.320   0.750   136   112    5.0    307   258    62  0.241   2333
BG 5   2.0  935.64   0.360   0.850   136   112    5.3    307   258    62  0.241   2474
BH 1   2.0  936.71   0.350   0.830   130   114    5.1    254   258    62  0.241   2354
BH 2   2.0  937.82   0.350   0.870   131   114    5.3    273   258    62  0.241   2385
BH 3   2.0  938.98   0.380   0.960   134   114    5.6    289   258    62  0.241   2512
BH 4   2.0  939.90   0.240   0.560   135   114    4.1    305   260    68  0.241   2018
BH 5   2.0  940.91   0.400   0.950   137   116    6.0    302   260    68  0.241   2600
BI 1   2.0  941.96   0.320   0.750   128   116    5.0    164   265    67  0.241   2104
BI 2   2.0  943.17   0.420   1.000   132   116    6.1    228   265    67  0.241   2531
BI 3   2.0  944.41   0.440   1.100   136   116    6.4    279   265    67  0.241   2685
BI 4   2.0  945.61   0.450   1.100   138   116    6.5    290   265    67  0.241   2735
BI 5   2.0  946.92   0.520   1.200   140   116    7.0    292   265    70  0.241   2944
BJ 1   2.0  947.93   0.360   0.850   130   116    5.2    268   265    67  0.241   2410
BJ 2   2.0  949.09   0.330   0.780   136   116    5.0    272   265    67  0.241   2314
BJ 3   2.0  950.31   0.460   1.100   138   116    6.9    290   265    67  0.241   2766
BJ 4   2.0  951.57   0.460   1.100   140   116    6.9    295   265    67  0.241   2775
BJ 5   2.0  952.85   0.500   1.200   141   116    6.9    294   265    67  0.241   2891
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UTPUT DATE - 08/18/80                                              KENVIRONS, INC.
      TIME - 11:57:27                                              PROJECT NO. 80019
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          BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
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                 PARTICULATE AND SO2 DATA WITH CALCULATED VALUES

                               RUN - STK003
                               DATE- 07/19/80

TMOS  ATMOS   STACK   H2O    PARTIC  STACK   INIT    PERC PERC PERC PITOT
EMP   PRES    PRES    COND   WT-TTL  AREA    VOL     O2   CO2  CO   TUBE
DG.F) (I.HG)  (I.HG)  (ML)   (MG)    (IN2)   (DCF)   DRY  DRY  DRY  COEF

 92   29.64   29.58  113.0    96.70  40828  508.66   8.7 10.4  0.0 0.840

     NBACL2        VT         VTB    VSOLN      VA
      (N)         (ML)        (ML)   (ML)      (ML)

 0.01016000      11.79       0.27   1000.0    10.0

PORT- SAMP  METER   DELTA    DELTA  TEMP TEMP TRAIN STACK BOX BATH PROBE    VEL
OINT  TIME  VOL       P        H    IN   OUT  VAC   TEMP TEMP TEMP T DIA
      (MIN) (DCF) (I.H2O)  (I.H2O)  (F)  (F) (I.HG)  (F)  (F)  (F)  (IN)  (FPM)

A  1   3.0  509.73  0.530   0.360  100   92   4.0   179  280   75 0.172   2739
A  2   3.0  510.94  0.730   0.500  108   92   4.3   184  275   70 0.172   3227
A  3   3.0  512.23  0.730   0.500  112   92   4.5   184  270   68 0.172   3227
A  4   3.0  513.48  0.870   0.570  115   94   4.9   188  265   63 0.172   3534
A  5   3.0  514.78  0.800   0.530  118   93   4.9   185  260   62 0.172   3381
A  6   3.0  516.06  0.800   0.530  120   94   4.8   188  270   62 0.172   3389
A  7   3.0  517.35  0.800   0.520  122   95   4.8   189  270   62 0.172   3391
D  1   3.0  518.42  0.530   0.350  118   98   3.8   172  250   72 0.172   2724
D  2   3.0  519.66  0.750   0.500  122   99   4.5   169  255   68 0.172   3233
D  3   3.0  520.91  0.750   0.500  124   99   4.5   170  250   66 0.172   3235
D  4   3.0  522.21  0.800   0.530  126   99   4.9   178  270   64 0.172   3363
D  5   3.0  523.51  0.800   0.530  128  100   4.9   182  290   66 0.172   3373
D  6   3.0  524.80  0.800   0.530  128  100   4.9   185  290   64 0.172   3381
D  7   3.0  526.10  0.800   0.530  129  100   5.0   199  290   64 0.172   3418
C  1   3.0  527.19  0.550   0.360  121  104   3.8   171  270   68 0.172   2773
C  2   3.0  528.36  0.650   0.430  126  103   4.1   165  285   67 0.172   3000
C  3   3.0  529.62  0.750   0.500  128  103   4.7   168  270   66 0.172   3230
C  4   3.0  530.90  0.750   0.500  129  103   4.8   166  265   65 0.172   3225
C  5   3.0  532.14  0.700   0.460  130  103   4.5   170  265   65 0.172   3126
C  6   3.0  533.38  0.700   0.460  131  103   4.5   169  265   66 0.172   3123
C  7   3.0  534.63  0.750   0.500  131  103   4.9   165  265   64 0.172   3222
B  1   3.0  535.68  0.500   0.340  122  106   3.8   164  275   70 0.172   2629
B  2   3.0  536.81  0.600   0.400  128  105   4.0   167  280   70 0.172   2887
B  3   3.0  538.08  0.800   0.530  130  105   4.9   167  270   66 0.172   3333
B  4   3.0  539.41  0.800   0.530  132  105   5.0   172  275   63 0.172   3347
B  5   3.0  540.73  0.800   0.530  132  105   5.0   173  275   64 0.172   3349
B  6   3.0  542.17  0.850   0.560  133  105   5.0   176  285   63 0.172   3461
B  7   3.0  543.43  0.850   0.560  134  105   5.0   178  280   63 0.172   3466
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OUTPUT DATE - 08/27/80
       TIME - 14:32:23                                   KENVIRONS, INC.
                                                         PROJECT NO. 80019
-----------------------------------------------------------------------------
      BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
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             PARTICULATE AND SO2 EMISSION DATA

    NAME   DESCRIPTION                UNITS

           TITLE OF RUN                          ESPA03     ESPB03     STK003
           DATE OF RUN                         07/19/80   07/19/80   07/19/80
           TIME OF RUN                        1036-1302  1035-1307  1040-1231
    DN     PROBE TIP DIAMETER             IN      0.238      0.241      0.172
    TT     NET TIME OF RUN               MIN      100.0      100.0       84.0
    NP     NUMBER OF SAMPLING POINTS                 50         50         28
    Y      DRY GAS METER CALIB. FACTOR           1.0250     1.0390     1.0158
    PB     BAROMETRIC PRES, LAB        IN.HG      29.86      29.86      29.86
    PBC    BAROMETRIC PRES, CONSOLE    IN.HG      29.81      29.81      29.64
    PM     AVG ORF PRES DROP          IN.H20      0.652      0.790      0.487
    VM     VOL DRY GAS-METER COND        DCF      45.59      51.15      34.77
    TM     AVG GAS METER TEMP          DEG.F      107.0      116.9      112.2
    VMSTD  VOL DRY GAS-STD COND         DSCF      43.42      48.56      32.32
    VW     TOTAL H20 COLLECTED            ML       97.9       94.9      113.0
    VWV    VOL H20 VAPOR-STD COND        SCF       4.61       4.47       5.32
    PMOS   PERCENT MOISTURE BY VOLUME               9.6        8.4       14.1
    MD     MOLE FRACTION DRY GAS                  0.904      0.916      0.859
    PCO2   PERCENT CO2 BY VOLUME, DRY              11.5       11.8       10.4
    PO2    PERCENT O2 BY VOLUME, DRY                7.8        7.8        8.7
    PCO    PERCENT CO BY VOLUME, DRY                0.0        0.0        0.0
    PN2    PERCENT N2 BY VOLUME, DRY               80.8       80.5       80.9
    MWD    MOLECULAR WT-DRY STK GAS               30.15      30.19      30.01
    MW     MOLECULAR WT-STK GAS                   28.99      29.16      28.32
    CP     PITOT TUBE COEFFICIENT                 0.840      0.840      0.840
    DPS    AVG SQRT STK VEL HEAD      IN.H20      0.557      0.571      0.854
    TS     AVG STACK TEMPERATURE       DEG.F      309.7      294.5      175.8
    PS     STACK PRESSURE, ABSOLUTE    IN.HG      28.69      28.70      29.58
    VS     AVG STACK GAS VELOCITY        FPM       2310       2340       3210
    AS     STACK AREA                    IN2      33618      33618      40828
    QS     STK FLOWRATE, DRY, STD      DSCFM     321000     335000     641000
    QA     ACTUAL STACK FLOWRATE        ACFM     539000     545000     909000
    PERI   PERCENT ISOKINETIC                     102.3      106.8      105.5
    MT     PARTICULATE WT-TOTAL           MG    1194.70    1515.90      96.70
    CAN    PART. LOAD-TTL, STD      GR/DSCF       0.425      0.482      0.046
    C      PART. LOAD-TTL, STD      LB/DSCF   .00006070  .00006880  .00000659
    CAT    PART. LOAD-TTL, STK       GR/ACF       0.252      0.296      0.033
    CAW    PART. EMIS-TOTAL           LB/HR   1167.1276  1384.0506   254.0000
    E      EMISSION RATE           LB/MMBTU      0.9470     1.0700     0.1110
    F      F FACTOR             DSCF/MMBTU         9820       9820       9820
    SCONC  SO2, CONC., STD          LB/DSCF    3.66E-04   3.80E-04   2.56E-05
    SCONCA SO2, CONC., STK           LB/ACF    2.18E-04   2.34E-04   1.80E-05
    SCHR   SO2 EMISSION RATE          LB/HR    7051.010   7645.321    983.000
    SCMM   SO2 EMISSION RATE       LB/MMBTU       5.720      5.930      0.430
    SCPPM  SO2, CONC., STD              PPM        2210       2290        154
    SCPPMA SO2, CONC., STK              PPM        2000       2100        133
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OUTPUT DATE - 08/18/80
       TIME - 11:58:03                                      KENVIRONS, INC.
                                                            PROJECT NO. 80019
-----------------------------------------------------------------------------
         BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
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              PARTICULATE AND SO2 DATA WITH CALCULATED VALUES

                               RUN - ESPA04
                               DATE- 07/20/80

ATMOS  ATMOS  STACK   H20    PARTIC  STACK  INIT   PERC PERC PERC PITOT
TEMP   PRES   PRES    COND   WT-TTL  AREA   VOL    02   CO2  CO   TUBE
(DG.F) (I.HG) (I.HG)  (ML)   (MG)    (IN2)  (DCF)  DRY  DRY  DRY  COEF

  95   29.80  28.75   96.0  1080.90  33618  276.56  8.5 12.8  0.0 0.840

   NBACL2        VT       VTB    VSOLN      VA
    (N)         (ML)      (ML)    (ML)      (ML)

 0.01021000     22.97     0.05   1000.0     1.0


PORT- SAMP   METER   DELTA   DELTA  TEMP TEMP TRAIN STACK BOX BATH PROBE  VEL
POINT TIME   VOL       P       H     IN   OUT  VAC  TEMP TEMP TEMP T DIA
      (MIN)  (DCF) (I.H2O) (I.H2O)  (F)  (F) (I.HG)  (F)  (F)  (F)  (IN) (FPM)

AJ 1   2.0  277.68  0.420   0.910   101   99   5.2   266  250    - 0.238  2597
AJ 2   2.0  278.83  0.440   0.950   104  100   5.0   275  250    - 0.238  2675
AJ 3   2.0  279.93  0.430   0.870   106  101   4.7   283  255   60 0.238  2659
AJ 4   2.0  281.02  0.430   0.870   108  101   4.7   283  260   60 0.238  2659
AJ 5   2.0  282.23  0.560   1.150   110  102   5.8   281  270   58 0.238  3030
AI 1   2.0  283.31  0.420   0.850   108  104   4.7   284  275    - 0.238  2629
AI 2   2.0  284.39  0.430   0.870   112  105   4.8   286  270    - 0.238  2664
AI 3   2.0  285.52  0.460   0.940   115  106   4.9   295  270   58 0.238  2772
AI 4   2.0  286.66  0.470   0.950   116  107   5.0   293  275   58 0.238  2798
AI 5   2.0  287.91  0.560   1.150   118  108   5.9   293  275   56 0.238  3054
AH 1   2.0  288.81  0.290   0.580   114  108   3.7   280  275    - 0.238  2179
AH 2   2.0  289.74  0.310   0.620   117  109   3.8   292  270    - 0.238  2271
AH 3   2.0  290.73  0.350   0.710   119  110   4.1   304  265   60 0.238  2432
AH 4   2.0  291.64  0.300   0.600   120  111   3.8   301  265   60 0.238  2248
AH 5   2.0  292.65  0.380   0.770   122  111   4.3   301  270   60 0.238  2529
AG 1   2.0  293.37  0.180   0.360   116  112   2.9   287  270    - 0.238  1725
AG 2   2.0  294.23  0.280   0.560   120  113   3.6   297  275    - 0.238  2166
AG 3   2.0  295.13  0.300   0.600   122  113   3.8   304  275   60 0.238  2252
AG 4   2.0  296.05  0.300   0.600   123  114   3.8   300  275   62 0.238  2246
AG 5   2.0  297.03  0.350   0.710   125  115   4.1   296  280   62 0.238  2420
AF 1   2.0  297.61  0.120   0.240   118  115   2.3   287  280    - 0.238  1408
AF 2   2.0  298.14  0.100   0.200   120  115   2.1   289  280    - 0.238  1287
AF 3   2.0  298.58  0.070   0.140   119  116   2.0   306  285   66 0.238  1089
AF 4   2.0  299.32  0.210   0.420   123  117   3.0   308  280   68 0.238  1889
AF 5   2.0  300.10  0.220   0.440   125  117   3.1   311  280   68 0.238  1937
AE 1   2.0  300.58  0.050   0.110   118  117   0.0   233  280    - 0.238   876
AE 2   2.0  300.84  0.040   0.080   120  118   0.0   284  285    - 0.238   811
AE 3   2.0  301.29  0.080   0.160   121  119   2.0   311  285   68 0.238  1168
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OUTPUT DATE - 08/18/80                                  KENVIRONS, INC.
       TIME - 11:58:03                                  PROJECT NO. 80019
------------------------------------------------------------------------------
          BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
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PORT- SAMP  METER    DELTA    DELTA  TEMP TEMP  TRAIN STACK BOX  BATH PROBE   VEL
POINT TIME   VOL       P        H     IN   OUT   VAC  TEMP  TEMP TEMP T DIA
     (MIN)  (DCF) (I.H2O) (I.H2O)  (F)  (F) (I.HG)  (F)   (F)  (F)  (IN)  (FPM)

AE 4   2.0  301.99  0.180   0.360  125  119    2.9   324   285   70 0.238  1767
AE 5   2.0  302.72  0.190   0.380  126  120    3.1   324   285   68 0.238  1815
AD 1   2.0  303.42  0.180   0.360  122  118    2.9   281   270    - 0.238  1718
AD 2   2.0  304.23  0.240   0.480  125  119    3.3   309   265    - 0.238  2021
AD 3   2.0  305.07  0.250   0.510  127  120    3.5   331   265   66 0.238  2092
AD 4   2.0  305.92  0.260   0.520  128  121    3.6   333   265   64 0.238  2136
AD 5   2.0  306.78  0.290   0.550  129  121    3.7   322   260   62 0.238  2240
AC 1   2.0  307.60  0.230   0.490  124  119    3.5   203   270    - 0.238  1837
AC 2   2.0  308.53  0.330   0.660  128  120    4.1   307   270    - 0.238  2366
AC 3   2.0  309.48  0.330   0.660  130  121    4.1   323   270   62 0.238  2391
AC 4   2.0  310.40  0.300   0.600  130  122    4.0   330   270   60 0.238  2290
AC 5   2.0  311.34  0.340   0.650  131  123    4.2   336   265   60 0.238  2447
AB 1   2.0  312.19  0.250   0.540  123  120    3.8   266   270    - 0.238  2004
AB 2   2.0  313.22  0.450   0.900  129  121    5.1   301   270    - 0.238  2753
AB 3   2.0  314.31  0.420   0.840  130  122    5.1   331   265   62 0.238  2711
AB 4   2.0  315.29  0.360   0.690  130  122    4.5   340   260   63 0.238  2524
AB 5   2.0  316.35  0.430   0.820  131  122    5.0   332   260   62 0.238  2745
AA 1   2.0  317.25  0.300   0.600  126  121    4.1   299   260    - 0.238  2245
AA 2   2.0  318.28  0.390   0.780  129  121    5.0   317   265    - 0.238  2589
AA 3   2.0  319.26  0.350   0.670  129  122    4.8   337   265   62 0.238  2484
AA 4   2.0  320.26  0.380   0.740  130  122    5.1   341   265   64 0.238  2595
AA 5   2.0  321.32  0.430   0.820  131  123    5.4   345   265   63 0.238  2767
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OUTPUT DATE - 08/18/80
       TIME - 11:58:04                                    KENVIRONS, INC.
------------------------------------------------------    PROJECT NO. 80019
-------------------------------------------------------------------------------
      BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
-------------------------------------------------------------------------------

              PARTICULATE AND SO2 DATA WITH CALCULATED VALUES

                               RUN - ESPB04
                               DATE- 07/20/80

ATMOS  ATMOS  STACK   H2O    PARTIC  STACK  INIT    PERC PERC PERC PITOT
TEMP   PRES   PRES    COND   WT-TTL  AREA   VOL     O2   CO2  CO   TUBE
(DG.F) (I.HG) (I.HG)  (ML)   (MG)    (IN2)  (DCF)   DRY  DRY  DRY  COEF

  95   29.80  28.75   68.5   899.40  33618  961.90  9.0  12.1  0.0 0.840

     NBACL2        VT       VTB    VSOLN      VA
      (N)         (ML)      (ML)    (ML)     (ML)

  0.01021000     24.18      0.04   1000.0    1.0


PORT- SAMP  METER     DELTA    DELTA  TEMP TEMP TRAIN STACK BOX BATH PROBE    VEL
POINT TIME   VOL        P        H     IN   OUT  VAC   TEMP TEMP TEMP T DIA
      (MIN) (DCF)  (I.H2O) (I.H2O)  (F)  (F) (I.HG)   (F)  (F)  (F)  (IN)  (FPM)

BA 1   2.0  962.90  0.300   0.750   108  102   5.4    260  245    - 0.241  2176
BA 2   2.0  963.97  0.350   0.830   112  103   5.7    311  245   65 0.241  2433
BA 3   2.0  965.00  0.350   0.790   117  103   5.5    325  245   64 0.241  2455
BA 4   2.0  966.07  0.340   0.780   119  103   5.5    332  250   64 0.241  2430
BA 5   2.0  967.10  0.400   0.900   122  104   6.0    338  250   64 0.241  2646
BB 1   2.0  968.17  0.320   0.890   116  106   6.0    218  265   64 0.241  2181
BB 2   2.0  969.24  0.320   0.870   123  107   6.0    240  265   64 0.241  2216
BB 3   2.0  970.30  0.350   0.850   123  107   5.7    311  270   67 0.241  2433
BB 4   2.0  971.30  0.330   0.740   124  107   5.5    337  270   67 0.241  2402
BB 5   2.0  972.38  0.390   0.890   128  107   6.0    344  270   67 0.241  2622
BC 1   2.0  973.24  0.220   0.570   122  108   4.8    204  275    - 0.241  1790
BC 2   2.0  974.25  0.300   0.790   126  108   5.7    239  275   70 0.241  2145
BC 3   2.0  975.30  0.300   0.700   128  109   5.5    316  275   68 0.241  2260
BC 4   2.0  976.17  0.270   0.600   130  109   4.9    336  275   67 0.241  2171
BC 5   2.0  977.10  0.300   0.660   131  110   5.1    341  375   65 0.241  2296
BD 1   2.0  977.87  0.170   0.460   124  110   4.1    204  275    - 0.241  1573
BD 2   2.0  978.76  0.220   0.550   130  110   4.9    246  275    - 0.241  1846
BD 3   2.0  979.61  0.240   0.570   131  110   4.8    297  285   67 0.241  1996
BD 4   2.0  980.50  0.230   0.550   132  112   4.7    326  285   65 0.241  1991
BD 5   2.0  981.35  0.250   0.570   132  112   4.7    326  285   65 0.241  2076
BE 1   2.0  981.80  0.070   0.180   126  112   2.4    189  280    - 0.241   998
BE 2   2.0  982.43  0.120   0.330   128  112   2.3    213  280    - 0.241  1331
BE 3   2.0  983.07  0.120   0.290   130  112   2.1    277  280   67 0.241  1393
BE 4   2.0  983.78  0.160   0.370   134  114   3.7    313  280   68 0.241  1647
BE 5   2.0  984.50  0.200   0.460   139  114   3.8    320  290   68 0.241  1850
BF 1   2.0  985.10  0.080   0.220   124  114   2.7    179  295    - 0.241  1059
BF 2   2.0  985.70  0.120   0.300   130  114   3.1    220  295    - 0.241  1338
BF 3   2.0  986.31  0.120   0.280   134  116   3.1    294  290   68 0.241  1409
```

OUTPUT DATE - 08/18/80
TIME - 11:58:04

KENVIRONS, INC.
PROJECT NO. 80019

BECHTEL 1980 DEMO-ACCEPTANCE TEST - LG&E CANE RUN NO.6

PORT-POINT	SAMP TIME (MIN)	METER VOL (DCF)	DELTA P (I.H2O)	DELTA H (I.H2O)	TEMP IN (F)	TEMP OUT (F)	TRAIN VAC (I.HG)	STACK TEMP (F)	BOX TEMP (F)	BATH TEMP (F)	PROBE T DIA (IN)	VEL (FPM)
BF 4	2.0	987.01	0.170	0.390	136	116	3.9	308	290	67	0.241	1692
BF 5	2.0	987.78	0.180	0.430	136	116	4.0	310	290	64	0.241	1743
BG 1	2.0	988.46	0.180	0.340	126	116	3.4	231	290	64	0.241	1652
BG 2	2.0	989.24	0.190	0.460	134	117	4.1	279	290	-	0.241	1755
BG 3	2.0	990.10	0.230	0.540	136	117	4.6	300	285	66	0.241	1958
BG 4	2.0	991.07	0.230	0.540	138	117	4.6	306	285	66	0.241	1966
BG 5	2.0	991.85	0.240	0.600	139	117	5.0	307	285	63	0.241	2009
BH 1	2.0	992.73	0.220	0.600	130	117	4.7	197	285	-	0.241	1780
BH 2	2.0	993.69	0.250	0.640	136	117	5.0	231	285	-	0.241	1946
BH 3	2.0	994.63	0.270	0.640	138	118	5.1	299	285	66	0.241	2120
BH 4	2.0	995.45	0.160	0.380	139	118	3.9	303	285	65	0.241	1636
BH 5	2.0	996.33	0.280	0.660	140	118	5.0	301	285	65	0.241	2162
BI 1	2.0	997.40	0.330	0.850	132	116	6.0	230	285	-	0.241	2235
BI 2	2.0	998.46	0.340	0.830	136	116	6.0	267	285	-	0.241	2328
BI 3	2.0	999.51	0.360	0.850	140	116	6.0	288	285	66	0.241	2430
BI 4	2.0	1000.59	0.360	0.850	140	116	6.1	298	285	66	0.241	2446
BI 5	2.0	1001.78	0.430	1.000	142	117	7.0	292	285	66	0.241	2663
BJ 1	2.0	1002.74	0.280	0.710	132	118	5.1	254	285	-	0.241	2094
BJ 2	2.0	1003.78	0.310	0.720	138	118	5.6	283	280	66	0.241	2248
BJ 3	2.0	1004.86	0.380	0.900	141	119	6.4	294	280	66	0.241	2507
BJ 4	2.0	1005.97	0.390	0.910	142	119	6.4	294	280	66	0.241	2540
BJ 5	2.0	1007.13	0.460	1.100	143	119	7.1	291	280	66	0.241	2753

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OUTPUT DATE - 08/18/80
       TIME - 11:58:05                                          KENVIRONS, INC.
-------------------------------------------------------------   PROJECT NO. 80019
          BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
---------------------------------------------------------------------------------

                 PARTICULATE AND SO2 DATA WITH CALCULATED VALUES

                               RUN - STK004
                               DATE- 07/20/80
ATMOS  ATMOS  STACK   H2O    PARTIC  STACK  INIT     PERC PERC PERC PITOT
TEMP   PRES   PRES    COND   WT-TTL  AREA   VOL      O2   CO2  CO   TUBE
(DG.F) (I.HG) (I.HG)  (ML)   (MG)    (IN2)  (DCF)    DRY  DRY  DRY  COEF

 92    29.63  29.57  115.7   91.20   40828  550.10   8.2  10.8  0.0 0.840

      NBACL2        VT        VTB    VSOLN      VA
       (N)         (ML)       (ML)    (ML)     (ML)

  0.01016000      11.63      0.01    1000.0    10.0


PORT- SAMP  METER    DELTA    DELTA  TEMP TEMP TRAIN STACK BOX  BATH PROBE  VEL
POINT TIME  VOL        P        H     IN  OUT   VAC  TEMP  TEMP TEMP T DIA
      (MIN) (DCF)  (I.H2O)  (I.H2O)  (F)  (F) (I.HG)  (F)  (F)  (F)  (IN)  (FPM)

A  1   3.0  551.15  0.530   0.340   108  100   4.0   179   270   74 0.172  2741
A  2   3.0  552.27  0.620   0.400   115  100   4.0   187   270   72 0.172  2983
A  3   3.0  553.54  0.800   0.520   119  100   4.8   183   260   70 0.172  3378
A  4   3.0  554.81  0.800   0.520   122  100   4.8   182   260   70 0.172  3375
A  5   3.0  556.09  0.800   0.520   125  101   4.9   186   260   70 0.172  3386
A  6   3.0  557.38  0.800   0.520   128  102   4.9   186   260   70 0.172  3386
A  7   3.0  558.66  0.800   0.520   129  103   5.0   191   270   70 0.172  3399
D  1   3.0  559.74  0.550   0.360   123  106   3.9   180   270   68 0.172  2794
D  2   3.0  560.96  0.750   0.490   129  106   4.7   180   260   68 0.172  3263
D  3   3.0  562.20  0.750   0.490   131  106   4.7   174   250   67 0.172  3248
D  4   3.0  563.50  0.800   0.520   132  106   4.9   171   250   67 0.172  3346
D  5   3.0  564.78  0.800   0.520   133  107   5.0   180   250   67 0.172  3370
D  6   3.0  566.01  0.800   0.520   134  107   5.0   184   260   66 0.172  3381
D  7   3.0  567.37  0.800   0.520   135  107   5.0   188   260   66 0.172  3391
C  1   3.0  568.41  0.500   0.320   127  110   3.8   174   270   72 0.172  2652
C  2   3.0  569.52  0.600   0.390   132  110   4.0   173   270   72 0.172  2903
C  3   3.0  570.80  0.800   0.520   132  110   4.9   175   265   70 0.172  3357
C  4   3.0  572.10  0.800   0.520   135  110   5.0   168   265   70 0.172  3338
C  5   3.0  573.39  0.800   0.520   135  110   5.0   174   255   70 0.172  3354
C  6   3.0  574.68  0.800   0.520   136  110   5.0   178   255   70 0.172  3365
C  7   3.0  575.98  0.800   0.520   137  110   5.0   186   255   68 0.172  3386
B  1   3.0  576.96  0.450   0.290   125  112   3.5   174   265   77 0.172  2516
B  2   3.0  578.10  0.650   0.420   133  112   4.2   177   270   77 0.172  3031
B  3   3.0  579.38  0.800   0.520   135  112   5.0   178   265   72 0.172  3365
B  4   3.0  580.68  0.800   0.520   136  112   5.2   179   265   72 0.172  3367
B  5   3.0  581.98  0.800   0.520   137  111   5.0   178   265   68 0.172  3365
B  6   3.0  583.29  0.800   0.520   138  111   5.0   177   270   70 0.172  3362
B  7   3.0  584.59  0.800   0.520   138  111   5.0   175   280   72 0.172  3357
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OUTPUT DATE - 08/27/80
       TIME - 14:32:46                                     KENVIRONS, INC.
----------------------------------------------------------  PROJECT NO. 80019
         BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
-------------------------------------------------------------------------------

                 PARTICULATE AND SO2 EMISSION DATA

      NAME   DESCRIPTION                  UNITS

             TITLE OF RUN                             ESPA04      ESPB04      STK004
             DATE OF RUN                            07/20/80    07/20/80    07/20/80
             TIME OF RUN                           1230-1454   1230-1448   1235-1424
      DN     PROBE TIP DIAMETER             IN         0.238       0.241       0.172
      TT     NET TIME OF RUN                MIN        100.0       100.0        84.0
      NP     NUMBER OF SAMPLING POINTS                    50          50          28
      Y      DRY GAS METER CALIB. FACTOR              1.0245      1.0355      1.0155
      PB     BAROMETRIC PRES, LAB           IN.HG      29.85       29.85       29.85
      PBC    BAROMETRIC PRES, CONSOLE       IN.HG      29.80       29.80       29.63
      PM     AVG ORF PRES DROP              IN.H2O     0.621       0.634       0.478
      VM     VOL DRY GAS-METER COND         DCF        44.76       45.23       34.49
      TM     AVG GAS METER TEMP             DEG.F      118.1       121.7       118.6
      VMSTD  VOL DRY GAS-STD COND           DSCF       41.77       42.40       31.69
      VW     TOTAL H2O COLLECTED            ML.         96.0        68.5       115.7
      VWV    VOL H2O VAPOR-STD COND         SCF         4.52        3.22        5.45
      PMOS   PERCENT MOISTURE BY VOLUME                  9.8         7.1        14.7
      MD     MOLE FRACTION DRY GAS                     0.902       0.929       0.853
      PCO2   PERCENT CO2 BY VOLUME, DRY                 12.8        12.1        10.8
      PO2    PERCENT O2 BY VOLUME, DRY                   8.5         9.0         8.2
      PCO    PERCENT CO BY VOLUME, DRY                   0.0         0.0         0.0
      PN2    PERCENT N2 BY VOLUME, DRY                  78.8        78.9        81.0
      MWD    MOLECULAR WT-DRY STK GAS                  30.38       30.30       30.06
      MW     MOLECULAR WT-STK GAS                      29.17       29.43       28.29
      CP     PITOT TUBE COEFFICIENT                    0.840       0.840       0.840
      DPS    AVG SQRT STK VEL HEAD          IN.H2O     0.541       0.504       0.855
      TS     AVG STACK TEMPERATURE          DEG.F      301.2       280.4       179.2
      PS     STACK PRESSURE, ABSOLUTE       IN.HG      28.75       28.75       29.57
      VS     AVG STACK GAS VELOCITY         FPM         2220        2030        3220
      AS     STACK AREA                     IN2        33618       33618       40828
      QS     STK FLOWRATE, DRY, STD         DSCFM     311000      302000      636000
      QA     ACTUAL STACK FLOWRATE          ACFM      518000      474000      913000
      PERI   PERCENT ISOKINETIC                        101.3       103.5       104.2
      MT     PARTICULATE WT-TOTAL           MG       1080.90      899.40       91.20
      CAN    PART. LOAD-TTL, STD            GR/DSCF    0.399       0.327       0.044
      C      PART. LOAD-TTL, STD            LB/DSCF .00005700   .00004680   .00000634
      CAT    PART. LOAD-TTL, STK            GR/ACF     0.240       0.208       0.031
      CAW    PART. EMIS-TOTAL               LB/HR  1066.0365    847.0000    242.0000
      E      EMISSION RATE                  LB/MMBTU  0.9440      0.8060      0.1030
      F      F FACTOR                    DSCF/MMBTU     9820        9820        9820
      SCONC  SO2, CONC., STD                LB/DSCF 3.96E-04    4.10E-04    2.63E-05
      SCONCA SO2, CONC., STK                LB/ACF  2.38E-04    2.61E-04    1.83E-05
      SCHR   SO2 EMISSION RATE              LB/HR   7394.102    7437.808    1003.707
      SCMM   SO2 EMISSION RATE              LB/MMBTU   6.550       7.080       0.425
      SCPPM  SO2, CONC., STD                PPM         2390        2480         159
      SCPPMA SO2, CONC., STK                PPM         2150        2300         135
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OUTPUT DATE - 08/18/80
       TIME - 11:58:48                                    KENVIRONS, INC.
-------------------------------------------------------   PROJECT NO. 80019
------------------------------------------------------------------------------
        BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
------------------------------------------------------------------------------

             PARTICULATE AND SO2 DATA WITH CALCULATED VALUES

                              RUN - ESPA05
                              DATE- 07/21/80

ATMOS  ATMOS  STACK   H2O    PARTIC  STACK  INIT   PERC PERC PERC PITOT
TEMP   PRES   PRES    COND   WT-TTL  AREA   VOL    O2   CO2  CO   TUBE
(DG.F) (I.HG) (I.HG)  (ML)   (MG)    (IN2)  (DCF)  DRY  DRY  DRY  COEF

  95   29.83  28.73  102.5  1397.10  33618  327.84  7.8 12.8  0.0 0.840

     NBACL2       VT       VTB    VSOLN      VA
      (N)        (ML)      (ML)    (ML)     (ML)

 0.01021000     23.37      0.02   1000.0    1.0


PORT- SAMP  METER    DELTA    DELTA  TEMP TEMP TRAIN STACK BOX  BATH PROBE   VEL
POINT TIME   VOL       P        H     IN  OUT   VAC  TEMP  TEMP TEMP T DIA
      (MIN) (DCF)  (I.H2O)  (I.H2O)  (F)  (F) (I.HG)  (F)   (F)  (F)  (IN)  (FPM)

AA 1   2.0  328.75  0.290   0.580   101   99   5.0   288   260    - 0.238  2194
AA 2   2.0  329.80  0.410   0.820   103  100   5.7   310   265    - 0.238  2646
AA 3   2.0  330.80  0.370   0.680   106  101   5.0   333   275   62 0.238  2551
AA 4   2.0  331.80  0.400   0.740   107  101   5.1   338   270   61 0.238  2661
AA 5   2.0  332.87  0.460   0.840   109  102   5.8   339   275   61 0.238  2855
AB 1   2.0  333.80  0.300   0.640   106  102   4.7   271   270    - 0.238  2206
AB 2   2.0  334.86  0.460   0.910   110  103   6.0   305   270    - 0.238  2794
AB 3   2.0  335.97  0.460   0.910   111  103   6.0   330   270   60 0.238  2839
AB 4   2.0  337.01  0.410   0.760   112  104   5.2   339   270   60 0.238  2696
AB 5   2.0  338.09  0.470   0.880   113  104   6.0   336   270   58 0.238  2881
AC 1   2.0  338.91  0.250   0.490   108  104   4.0   275   270    - 0.238  2019
AC 2   2.0  339.84  0.340   0.670   112  105   5.0   295   265    - 0.238  2386
AC 3   2.0  340.80  0.340   0.670   113  105   5.0   323   270   66 0.238  2430
AC 4   2.0  341.70  0.310   0.570   114  106   4.6   335   270   67 0.238  2338
AC 5   2.0  342.63  0.350   0.640   115  106   5.0   342   270   67 0.238  2495
AD 1   2.0  343.37  0.200   0.400   109  106   3.8   295   270    - 0.238  1830
AD 2   2.0  344.20  0.250   0.490   113  106   4.1   304   270    - 0.238  2058
AD 3   2.0  345.06  0.270   0.530   115  107   4.2   330   270   66 0.238  2175
AD 4   2.0  345.93  0.270   0.530   116  108   4.2   331   270   66 0.238  2177
AD 5   2.0  346.82  0.310   0.570   117  108   4.8   325   270   64 0.238  2323
AE 1   2.0  347.18  0.050   0.100   109  108   2.0   270   275    - 0.238   900
AE 2   2.0  347.59  0.060   0.130   110  108   2.1   276   270    - 0.238   990
AE 3   2.0  348.12  0.100   0.200   112  109   2.8   313   270   72 0.238  1309
AE 4   2.0  348.86  0.200   0.400   115  109   3.8   324   270   74 0.238  1865
AE 5   2.0  349.61  0.220   0.400   116  109   3.8   327   275   68 0.238  1960
AF 1   2.0  350.24  0.140   0.280   112  109   3.1   293   270    - 0.238  1529
AF 2   2.0  350.87  0.140   0.280   114  110   3.1   311   270    - 0.238  1547
AF 3   2.0  351.38  0.090   0.180   114  110   2.7   320   270   74 0.238  1248
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OUTPUT DATE - 08/18/80
       TIME - 11:59:48                                   KENVIRONS, INC.
                                                         PROJECT NO. 80019
--------------------------------------------------------------------------------
      BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
--------------------------------------------------------------------------------

PORT- SAMP  METER   DELTA    DELTA  TEMP TEMP TRAIN STACK  BOX BATH PROBE   VEL
POINT TIME   VOL      P        H     IN  OUT   VAC  TEMP TEMP TEMP T DIA
      (MIN) (DCF) (I.H2O) (I.H2O)  (F)  (F) (I.HG)  (F)  (F)  (F)  (IN)  (FPM)

AF 4   2.0  352.16  0.240   0.470   117  110   4.1   319  270   68 0.238  2036
AF 5   2.0  353.01  0.270   0.530   118  110   4.5   321  270   66 0.238  2163
AG 1   2.0  353.75  0.200   0.400   113  110   3.9   284  270    - 0.238  1817
AG 2   2.0  354.63  0.290   0.570   117  110   4.8   310  270    - 0.238  2226
AG 3   2.0  355.57  0.320   0.630   118  110   5.1   313  265   60 0.238  2342
AG 4   2.0  356.50  0.320   0.630   118  111   5.1   310  265   61 0.238  2338
AG 5   2.0  357.43  0.320   0.630   118  110   5.1   307  270   60 0.238  2333
AH 1   2.0  358.34  0.300   0.590   114  109   5.0   291  250    - 0.238  2236
AH 2   2.0  359.28  0.330   0.650   117  109   5.2   302  245    - 0.238  2362
AH 3   2.0  360.29  0.380   0.750   118  110   6.0   306  260   60 0.238  2541
AH 4   2.0  361.25  0.330   0.650   118  110   5.5   305  275   58 0.238  2366
AH 5   2.0  362.29  0.430   0.850   119  110   6.8   303  275   60 0.238  2698
AI 1   2.0  363.37  0.440   0.870   114  109   6.5   282  250    - 0.238  2691
AI 2   2.0  364.48  0.460   0.900   118  109   6.8   301  240    - 0.238  2787
AI 3   2.0  365.62  0.470   0.920   119  110   7.0   303  240   62 0.238  2820
AI 4   2.0  366.75  0.480   0.950   120  111   7.2   301  250   61 0.238  2847
AI 5   2.0  367.95  0.560   1.100   121  111   8.0   298  250   62 0.238  3069
AJ 1   2.0  369.05  0.460   0.900   115  110   6.9   291  250    - 0.238  2768
AJ 2   2.0  370.21  0.510   1.000   119  111   7.5   301  250    - 0.238  2934
AJ 3   2.0  371.78  0.500   0.990   120  112   7.5   309  250   64 0.238  2920
AJ 4   2.0  372.55  0.500   0.990   122  113   7.6   306  255   62 0.238  2915
AJ 5   2.0  373.80  0.580   1.150   123  113   8.7   303  260   62 0.238  3133
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OUTPUT DATE - 08/18/80
       TIME - 11:58:49                                          KENVIRONS, INC.
                                                                PROJECT NO. 80019
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        BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
-------------------------------------------------------------------------------------

                  PARTICULATE AND SO2 DATA WITH CALCULATED VALUES

                                  RUN - ESPB05
                                  DATE- 07/21/80

ATMOS   ATMOS   STACK    H2O     PARTIC  STACK   INIT     PERC PERC PERC PITOT
TEMP    PRES    PRES     COND    WT-TTL  AREA    VOL      O2   CO2  CO   TUBE
(DG.F)  (I.HG)  (I.HG)   (ML)    (MG)    (IN2)   (DCF)    DRY  DRY  DRY  COEF

  95    29.83   28.73    97.3   1068.60  33618    14.41   8.3 13.0  0.0 0.840


     NBACL2         VT          VTB     VSOLN       VA
      (N)          (ML)         (ML)     (ML)       (ML)

  0.01021000      23.15        0.02    1000.0      1.0


PORT- SAMP  METER    DELTA    DELTA  TEMP TEMP TRAIN STACK BOX  BATH PROBE   VEL
POINT TIME   VOL       P        H     IN   OUT  VAC   TEMP TEMP TEMP T DIA
      (MIN) (DCF)  (I.H2O)  (I.H2O)  (F)  (F) (I.HG)  (F)  (F)  (F)  (IN)  (FPM)

BA 1   2.0  15.50   0.330    0.840   102   98   5.6   265  300    - 0.241  2301
BA 2   2.0  16.54   0.350    0.820   108   98   5.2   315  300    - 0.241  2450
BA 3   2.0  17.57   0.360    0.820   112   98   5.2   336  290   68 0.241  2518
BA 4   2.0  18.61   0.350    0.800   116   99   5.1   345  290   70 0.241  2497
BA 5   2.0  19.65   0.400    0.890   119   99   5.5   346  280   68 0.241  2671
BB 1   2.0  20.68   0.340    0.830   116  100   5.1   285  275    - 0.241  2368
BB 2   2.0  21.67   0.330    0.790   120  100   5.1   307  275    - 0.241  2367
BB 3   2.0  22.74   0.370    0.820   122  101   5.1   334  275   62 0.241  2550
BB 4   2.0  23.78   0.340    0.750   124  102   5.0   344  275   62 0.241  2460
BB 5   2.0  24.77   0.370    0.810   126  102   5.2   345  275   62 0.241  2567
BC 1   2.0  25.59   0.220    0.550   119  102   4.0   270  275    - 0.241  1885
BC 2   2.0  26.55   0.300    0.710   124  103   4.9   306  275    - 0.241  2255
BC 3   2.0  27.56   0.320    0.710   125  103   5.0   328  255   61 0.241  2362
BC 4   2.0  28.49   0.270    0.600   126  103   4.7   340  255   61 0.241  2186
BC 5   2.0  29.37   0.290    0.650   128  104   4.7   345  255   61 0.241  2273
BD 1   2.0  30.09   0.140    0.360   121  104   3.3   256  255    - 0.241  1489
BD 2   2.0  30.84   0.190    0.460   126  105   3.7   293  255    - 0.241  1779
BD 3   2.0  31.70   0.210    0.510   128  105   4.1   320  255   64 0.241  1904
BD 4   2.0  32.50   0.200    0.450   130  106   3.8   332  255   64 0.241  1872
BD 5   2.0  33.28   0.200    0.450   131  106   3.8   331  255   64 0.241  1871
BE 1   2.0  33.76   0.070    0.180   125  108   2.3   254  255    - 0.241  1052
BE 2   2.0  34.40   0.120    0.290   129  108   3.0   285  255    - 0.241  1407
BE 3   2.0  34.92   0.120    0.260   130  108   2.8   309  255   64 0.241  1429
BE 4   2.0  35.63   0.160    0.360   131  108   3.4   323  255   64 0.241  1665
BE 5   2.0  36.37   0.190    0.460   132  109   3.7   327  255   64 0.241  1819
BF 1   2.0  36.91   0.090    0.230   128  109   2.6   273  255    - 0.241  1208
BF 2   2.0  37.47   0.110    0.260   130  109   2.7   293  255    - 0.241  1354
BF 3   2.0  38.16   0.120    0.280   131  109   2.8   312  255   66 0.241  1432
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OUTPUT DATE - 08/18/80                                   KENVIRONS, INC.
       TIME - 11:58:49                                   PROJECT NO. 80019
--------------------------------------------------------------------------
        BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
--------------------------------------------------------------------------

 PORT- SAMP  METER   DELTA    DELTA  TEMP TEMP TRAIN STACK  BOX BATH PROBE  VEL
 POINT TIME   VOL      P        H     IN  OUT   VAC  TEMP TEMP TEMP T DIA
       (MIN) (DCF) (I.H2O) (I.H2O)  (F)  (F) (I.HG)  (F)  (F)  (F)  (IN) (FPM)

 BF 4   2.0  38.76  0.160   0.380   132  109   3.0   318  255   66 0.241  1660
 BF 5   2.0  39.57  0.170   0.380   132  109   3.5   320  255   66 0.241  1713
 BG 1   2.0  40.23  0.180   0.450   126  108   3.9   276  255    - 0.241  1712
 BG 2   2.0  41.02  0.180   0.440   129  108   3.9   301  255    - 0.241  1741
 BG 3   2.0  41.92  0.220   0.570   130  108   4.5   317  255   64 0.241  1945
 BG 4   2.0  42.80  0.220   0.570   131  108   4.6   318  255   64 0.241  1946
 BG 5   2.0  43.70  0.250   0.600   132  108   4.7   314  255   64 0.241  2069
 BH 1   2.0  44.63  0.270   0.650   126  108   4.9   292  255    - 0.241  2120
 BH 2   2.0  45.53  0.270   0.630   129  108   4.9   299  255    - 0.241  2130
 BH 3   2.0  46.53  0.290   0.670   130  108   4.9   306  255   64 0.241  2217
 BH 4   2.0  47.29  0.150   0.350   132  108   3.5   309  255   64 0.241  1598
 BH 5   2.0  48.20  0.300   0.700   132  108   5.0   306  255   64 0.241  2255
 BI 1   2.0  49.26  0.340   0.860   130  110   5.7   263  255    - 0.241  2332
 BI 2   2.0  50.30  0.350   0.850   130  110   5.7   272  255    - 0.241  2381
 BI 3   2.0  51.43  0.370   0.880   133  110   5.9   291  250   62 0.241  2480
 BI 4   2.0  52.47  0.340   0.800   135  110   5.7   299  250   62 0.241  2390
 BI 5   2.0  53.63  0.450   1.100   136  110   6.6   291  250   62 0.241  2735
 BJ 1   2.0  54.52  0.250   0.600   122  110   4.6   279  250    - 0.241  2022
 BJ 2   2.0  55.43  0.250   0.600   128  112   4.6   283  250    - 0.241  2027
 BJ 3   2.0  56.40  0.350   0.810   131  112   6.0   299  250   64 0.241  2425
 BJ 4   2.0  57.43  0.350   0.810   134  112   6.0   296  250   65 0.241  2420
 BJ 5   2.0  58.59  0.420   1.000   136  112   7.1   299  250   65 0.241  2656
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OUTPUT DATE - 08/18/80
       TIME - 11:58:49                                         KENVIRONS, INC.
                                                               PROJECT NO. 80019
------------------------------------------------------------------------------
       BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
------------------------------------------------------------------------------

                  PARTICULATE AND SO2 DATA WITH CALCULATED VALUES

                                 RUN - STK005
                                 DATE- 07/21/80

ATMOS  ATMOS  STACK   H2O    PARTIC  STACK  INIT    PERC PERC PERC PITOT
TEMP   PRES   PRES    COND   WT-TTL  AREA   VOL     O2   CO2  CO   TUBE
(DG.F) (I.HG) (I.HG)  (ML)   (MG)    (IN2)  (DCF)   DRY  DRY  DRY  COEF

  92   29.66  29.60  115.1    90.30  40828  591.05  8.1 10.7  0.0 0.840

     NBACL2       VT        VTB     VSOLN      VA
      (N)        (ML)       (ML)     (ML)     (ML)

  0.01023000      9.85      0.01    1000.0    10.0


PORT- SAMP  METER   DELTA   DELTA  TEMP TEMP TRAIN STACK BOX BATH PROBE  VEL
POINT TIME   VOL      P       H     IN   OUT  VAC  TEMP TEMP TEMP T DIA
     (MIN)  (DCF) (I.H2O) (I.H2O) (F)  (F) (I.HG)  (F)  (F)  (F)  (IN) (FPM)

A  1   3.0  592.07  0.500  0.320   99   97   4.1   168  275   70 0.172  2639
A  2   3.0  593.22  0.700  0.440  111   97   4.8   173  270   70 0.172  3135
A  3   3.0  594.57  0.800  0.500  115   97   5.0   169  275   68 0.172  3341
A  4   3.0  595.74  0.850  0.540  119   98   5.2   169  275   68 0.172  3444
A  5   3.0  597.00  0.800  0.500  121   98   5.0   171  280   68 0.172  3346
A  6   3.0  598.26  0.800  0.500  123   99   5.0   170  280   68 0.172  3344
A  7   3.0  599.51  0.800  0.500  125   99   5.1   168  280   64 0.172  3339
D  1   3.0  600.53  0.500  0.320  117  102   4.0   170  270   64 0.172  2644
D  2   3.0  601.66  0.630  0.400  123  103   4.3   174  265   63 0.172  2977
D  3   3.0  602.87  0.750  0.470  127  102   4.9   178  265   63 0.172  3258
D  4   3.0  604.12  0.800  0.500  129  103   5.0   174  250   62 0.172  3354
D  5   3.0  605.39  0.800  0.500  130  103   5.0   175  255   64 0.172  3357
D  6   3.0  606.66  0.800  0.500  131  104   5.1   175  270   63 0.172  3357
D  7   3.0  607.93  0.800  0.500  132  104   5.2   174  275   63 0.172  3354
C  1   3.0  609.00  0.500  0.320  122  107   4.0   166  275   64 0.172  2635
C  2   3.0  610.10  0.630  0.400  129  107   4.3   175  275   65 0.172  2979
C  3   3.0  611.30  0.750  0.470  131  106   5.0   178  255   66 0.172  3258
C  4   3.0  612.56  0.800  0.500  132  106   5.0   175  255   65 0.172  3357
C  5   3.0  613.85  0.800  0.500  133  106   5.1   177  260   64 0.172  3362
C  6   3.0  615.12  0.800  0.500  134  106   5.1   178  275   66 0.172  3365
C  7   3.0  616.39  0.800  0.500  134  107   5.1   178  275   66 0.172  3365
B  1   3.0  617.40  0.500  0.320  122  109   3.9   172  265   71 0.172  2648
B  2   3.0  618.55  0.680  0.430  130  109   4.8   178  260   70 0.172  3102
B  3   3.0  619.82  0.800  0.500  133  109   5.0   180  255   70 0.172  3370
B  4   3.0  621.08  0.800  0.500  134  109   5.1   180  245   69 0.172  3370
B  5   3.0  622.35  0.800  0.500  135  109   5.2   179  265   68 0.172  3368
B  6   3.0  623.62  0.800  0.500  135  108   5.2   178  280   70 0.172  3365
B  7   3.0  624.90  0.800  0.500  135  108   5.2   179  285   68 0.172  3368
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OUTPUT DATE - 08/27/80
       TIME - 14:33:13                                       KENVIRONS, INC.
                                                             PROJECT NO. 80019
------------------------------------------------------------------------------
     BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
------------------------------------------------------------------------------

                 PARTICULATE AND SO2 EMISSION DATA

      NAME   DESCRIPTION                 UNITS

             TITLE OF RUN                            ESPA05     ESPB05     STK005
             DATE OF RUN                           07/21/80   07/21/80   07/21/80
             TIME OF RUN                          1030-1243  1030-1233  1030-1219
      DN     PROBE TIP DIAMETER             IN        0.238      0.241      0.172
      TT     NET TIME OF RUN               MIN        100.0      100.0       84.0
      NP     NUMBER OF SAMPLING POINTS                   50         50         28
      Y      DRY GAS METER CALIB. FACTOR             1.0250     1.0350     1.0155
      PB     BAROMETRIC PRES, LAB        IN.HG        29.88      29.88      29.88
      PBC    BAROMETRIC PRES, CONSOLE    IN.HG        29.83      29.83      29.66
      PM     AVG ORF PRES DROP          IN.H2O        0.648      0.613      0.462
      VM     VOL DRY GAS-METER COND        DCF        45.96      44.19      33.86
      TM     AVG GAS METER TEMP          DEG.F        110.9      116.5      115.2
      VMSTD  VOL DRY GAS-STD COND         DSCF        43.50      41.82      31.32
      VW     TOTAL H2O COLLECTED            ML        102.5       97.3      115.1
      VWV    VOL H2O VAPOR-STD COND        SCF         4.82       4.58       5.42
      PMOS   PERCENT MOISTURE BY VOLUME                10.0        9.9       14.7
      MD     MOLE FRACTION DRY GAS                    0.900      0.901      0.853
      PCO2   PERCENT CO2 BY VOLUME, DRY                12.8       13.0       10.7
      PO2    PERCENT O2 BY VOLUME, DRY                  7.8        8.3        8.1
      PCO    PERCENT CO BY VOLUME, DRY                  0.0        0.0        0.0
      PN2    PERCENT N2 BY VOLUME, DRY                 79.5       78.7       81.2
      MWD    MOLECULAR WT-DRY STK GAS                 30.35      30.41      30.03
      MW     MOLECULAR WT-STK GAS                     29.12      29.19      28.26
      CP     PITOT TUBE COEFFICIENT                   0.840      0.840      0.840
      DPS    AVG SQRT STK VEL HEAD      IN.H2O        0.563      0.500      0.855
      TS     AVG STACK TEMPERATURE       DEG.F        308.9      305.3      174.3
      PS     STACK PRESSURE, ABSOLUTE    IN.HG        28.73      28.73      29.60
      VS     AVG STACK GAS VELOCITY        FPM         2320       2060       3210
      AS     STACK AREA                    IN2        33618      33618      40828
      QS     STK FLOWRATE, DRY, STD      DSCFM       322000     287000     638000
      QA     ACTUAL STACK FLOWRATE        ACFM       542000     480000     909000
      PERI   PERCENT ISOKINETIC                       102.1      107.5      102.6
      MT     PARTICULATE WT-TOTAL           MG      1397.10    1068.60      90.30
      CAN    PART. LOAD-TTL, STD       GR/DSCF        0.496      0.394      0.044
      C      PART. LOAD-TTL, STD       LB/DSCF    .00007080  .00005630  .00000635
      CAT    PART. LOAD-TTL, STK        GR/ACF        0.294      0.235      0.031
      CAW    PART. EMIS-TOTAL            LB/HR    1367.5283   969.0000   243.0000
      E      EMISSION RATE            LB/MMBTU       1.1100     0.9200     0.1020
      F      F FACTOR               DSCF/MMBTU         9820       9820       9820
      SCONC  SO2, CONC., STD           LB/DSCF    3.87E-04   3.99E-04   2.27E-05
      SCONCA SO2, CONC., STK            LB/ACF    2.30E-04   2.38E-04   1.59E-05
      SCHR   SO2 EMISSION RATE           LB/HR    7474.553   6860.159    870.000
      SCMM   SO2 EMISSION RATE        LB/MMBTU       6.040      6.510      0.364
      SCPPM  SO2, CONC., STD               PPM        2330       2410        137
      SCPPMA SO2, CONC., STK               PPM        2100       2170        117
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OUTPUT DATE - 08/18/80                                       KENVIRONS, INC.
       TIME - 11:59:14                                       PROJECT NO. 80019
------------------------------------------------------------------------------
         BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
------------------------------------------------------------------------------

             PARTICULATE AND SO2 DATA WITH CALCULATED VALUES

                           RUN - ESPA06
                           DATE- 07/22/80

ATMOS  ATMOS  STACK   H2O    PARTIC  STACK  INIT    PERC PERC PERC PITOT
TEMP   PRES   PRES    COND   WT-TTL  AREA   VOL     O2   CO2  CO   TUBE
(DG.F) (I.HG) (I.HG)  (ML)   (MG)    (IN2)  (DCF)   DRY  DRY  DRY  COEF

  80   29.74  28.67  108.6  1212.20  33618  380.30  8.1 11.1  0.0 0.840


    NBACL2      VT       VTB    VSOLN     VA
     (N)       (ML)      (ML)    (ML)    (ML)

  0.01021000   23.46     0.02   1000.0    1.0


 PORT- SAMP  METER   DELTA   DELTA  TEMP TEMP TRAIN STACK BOX BATH PROBE  VEL
 POINT TIME   VOL      P       H     IN   OUT  VAC  TEMP TEMP TEMP T DIA
       (MIN) (DCF) (I.H2O) (I.H2O) (F)  (F) (I.HG)  (F)  (F)  (F)  (IN)  (FPM)

 AJ 1   2.0  381.33  0.410   0.790   77   76   5.0  276  270    - 0.238  2603
 AJ 2   2.0  382.37  0.440   0.850   81   77   5.0  280  270    - 0.238  2704
 AJ 3   2.0  383.44  0.440   0.850   82   77   5.0  285  270   60 0.238  2713
 AJ 4   2.0  384.51  0.450   0.870   85   78   5.0  285  270   56 0.238  2743
 AJ 5   2.0  385.68  0.530   1.050   87   78   5.9  281  270   56 0.238  2969
 AI 1   2.0  386.72  0.400   0.830   83   79   4.9  266  265    - 0.238  2553
 AI 2   2.0  387.80  0.420   0.860   87   80   5.0  282  265    - 0.238  2645
 AI 3   2.0  388.85  0.420   0.810   89   81   4.9  290  265   58 0.238  2659
 AI 4   2.0  389.91  0.430   0.830   90   81   5.0  290  265   57 0.238  2691
 AI 5   2.0  391.04  0.510   1.000   92   82   5.8  291  270   55 0.238  2932
 AH 1   2.0  391.96  0.310   0.630   88   82   4.1  262  270    - 0.238  2242
 AH 2   2.0  392.93  0.340   0.700   91   83   4.3  282  270    - 0.238  2380
 AH 3   2.0  393.90  0.360   0.700   92   83   4.3  299  265   60 0.238  2477
 AH 4   2.0  394.82  0.310   0.600   93   84   4.0  298  265   60 0.238  2297
 AH 5   2.0  395.81  0.380   0.740   94   84   4.7  299  270   58 0.238  2545
 AG 1   2.0  396.46  0.150   0.310   89   84   2.9  267  270    - 0.238  1565
 AG 2   2.0  397.30  0.280   0.540   93   85   3.8  299  265    - 0.238  2184
 AG 3   2.0  398.18  0.290   0.570   94   86   3.9  307  265   60 0.238  2235
 AG 4   2.0  399.06  0.290   0.570   95   86   3.9  306  265   60 0.238  2233
 AG 5   2.0  399.99  0.330   0.640   96   86   4.1  300  265   56 0.238  2373
 AF 1   2.0  400.53  0.100   0.210   89   86   2.2  250  265    - 0.238  1263
 AF 2   2.0  401.13  0.130   0.270   91   87   2.5  290  265    - 0.238  1480
 AF 3   2.0  401.62  0.080   0.150   91   88   2.0  308  265   62 0.238  1174
 AF 4   2.0  402.35  0.210   0.410   94   88   3.1  310  265   60 0.238  1905
 AF 5   2.0  403.13  0.230   0.440   95   88   3.2  314  265   58 0.238  1999
 AE 1   2.0  403.64  0.080   0.150   90   87   0.0  215  270    - 0.238  1101
 AE 2   2.0  404.03  0.060   0.120   90   88   0.0  295  265    - 0.238  1008
 AE 3   2.0  404.54  0.110   0.210   91   88   2.2  307  265   62 0.238  1376
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UTPUT DATE - 08/18/80
      TIME - 11:59:15                                          KENVIRONS, INC.
-------------------------------------------------------------- PROJECT NO. 80019
        BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
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PORT- SAMP  METER   DELTA    DELTA  TEMP TEMP TRAIN STACK BOX BATH PROBE   VEL
>OINT TIME   VOL      P        H     IN  OUT   VAC  TEMP TEMP TEMP T DIA
      (MIN) (DCF) (I.H2O)  (I.H2O)  (F)  (F) (I.HG)  (F)  (F)  (F)  (IN)  (FPM)

AE 4   2.0  405.25  0.200   0.390    94   89   3.0   319  265   60 0.238  1870
AE 5   2.0  406.01  0.220   0.420    96   89   3.1   320  270   58 0.238  1963
AD 1   2.0  406.75  0.200   0.390    90   88   3.1   284  275    - 0.238  1828
AD 2   2.0  407.55  0.250   0.480    93   88   3.6   314  275    - 0.238  2084
AD 3   2.0  408.39  0.270   0.520    95   89   3.8   328  275   60 0.238  2186
AD 4   2.0  409.22  0.270   0.490    96   89   3.7   325  275   60 0.238  2181
AD 5   2.0  410.10  0.300   0.580    97   89   4.0   312  275   60 0.238  2280
AC 1   2.0  410.89  0.240   0.460    94   89   3.5   281  280    - 0.238  1998
AC 2   2.0  411.79  0.310   0.600    97   89   4.1   307  280    - 0.238  2310
AC 3   2.0  412.69  0.310   0.600    98   90   4.1   316  280   62 0.238  2324
AC 4   2.0  413.59  0.300   0.580    99   90   4.0   324  280   62 0.238  2298
AC 5   2.0  414.55  0.350   0.680    99   90   4.8   330  280   60 0.238  2492
AB 1   2.0  415.45  0.300   0.610    95   90   4.0   264  280    - 0.238  2208
AB 2   2.0  416.50  0.420   0.820    99   90   5.1   296  280    - 0.238  2670
AB 3   2.0  417.55  0.410   0.800    99   90   5.0   320  280   62 0.238  2680
AB 4   2.0  418.56  0.390   0.760   100   91   4.9   330  280   62 0.238  2630
AB 5   2.0  419.60  0.440   0.800   100   91   5.1   330  280   62 0.238  2794
AA 1   2.0  420.50  0.290   0.600    95   89   4.1   271  280    - 0.238  2182
AA 2   2.0  421.49  0.410   0.800    98   90   5.1   305  280    - 0.238  2654
AA 3   2.0  422.50  0.380   0.740    99   90   4.9   325  280   60 0.238  2588
AA 4   2.0  423.51  0.400   0.740    99   90   5.0   331  280   62 0.238  2665
AA 5   2.0  424.54  0.440   0.800   100   90   5.2   332  280   62 0.238  2797
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OUTPUT DATE - 08/18/80                                  KENVIRONS, INC.
       TIME - 11:59:15                                  PROJECT NO. 80019
--------------------------------------------------------------------------------
         BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
--------------------------------------------------------------------------------

               PARTICULATE AND SO2 DATA WITH CALCULATED VALUES

                              RUN - ESPB06
                              DATE- 07/22/80

ATMOS  ATMOS  STACK    H2O    PARTIC  STACK   INIT     PERC PERC PERC PITOT
TEMP   PRES   PRES     COND   WT-TTL  AREA    VOL      O2   CO2  CO   TUBE
(DG.F) (I.HG) (I.HG)   (ML)   (MG)    (IN2)   (DCF)    DRY  DRY  DRY  COEF

  80   29.74  28.67  101.8  1788.20  33618    65.70   8.0 11.5  0.0 0.840


    NBACL2       VT        VTB    VSOLN      VA
     (N)        (ML)       (ML)    (ML)     (ML)

  0.01021000    23.95      0.02   1000.0     1.0



 PORT- SAMP  METER   DELTA   DELTA  TEMP TEMP TRAIN STACK  BOX BATH PROBE   VEL
 POINT TIME   VOL      P       H     IN   OUT  VAC  TEMP TEMP TEMP T DIA
       (MIN) (DCF) (I.H2O) (I.H2O)  (F)  (F) (I.HG)  (F)  (F)  (F)  (IN)  (FPM)

 BA 1   2.0  66.67  0.360  0.750    84   82   4.2   335  250    - 0.241  2531
 BA 2   2.0  67.59  0.430  0.870    86   82   2.3   340  250    - 0.241  2775
 BA 3   2.0  68.62  0.430  0.870    90   82   4.5   343  260   64 0.241  2780
 BA 4   2.0  69.68  0.450  0.900    97   83   4.8   342  260   64 0.241  2842
 BA 5   2.0  70.70  0.470  0.960   101   83   5.1   338  260   64 0.241  2898
 BB 1   2.0  71.76  0.510  1.000    98   84   4.9   297  260    - 0.241  2940
 BB 2   2.0  72.90  0.470  1.000   103   85   5.1   325  260    - 0.241  2874
 BB 3   2.0  73.96  0.470  0.950   106   86   4.9   339  270   60 0.241  2899
 BB 4   2.0  74.89  0.290  0.590   108   86   4.0   342  270   60 0.241  2282
 BB 5   2.0  75.80  0.320  0.640   110   86   4.1   338  270   61 0.241  2391
 BC 1   2.0  76.71  0.300  0.640   104   88   4.1   284  275    - 0.241  2235
 BC 2   2.0  77.58  0.270  0.580   107   88   3.9   298  275    - 0.241  2140
 BC 3   2.0  78.40  0.220  0.460   110   88   3.5   331  275   61 0.241  1974
 BC 4   2.0  79.09  0.090  0.190   115   88   2.1   336  275   61 0.241  1266
 BC 5   2.0  79.77  0.340  0.720   114   89   3.4   336  275   61 0.241  2461
 BD 1   2.0  80.65  0.220  0.490    98   92   3.5   251  245    - 0.241  1871
 BD 2   2.0  81.17  0.070  0.150   105   91   2.2   293  245    - 0.241  1086
 BD 3   2.0  81.72  0.050  0.110   109   91   3.1   321  245    - 0.241   935
 BD 4   2.0  82.30  0.120  0.250   110   91   2.8   327  235   66 0.241  1454
 BD 5   2.0  82.87  0.130  0.260   111   91   2.9   325  235   66 0.241  1511
 BE 1   2.0  83.30  0.070  0.160    95   91   2.1   252  270    - 0.241  1056
 BE 2   2.0  83.90  0.140  0.290   102   91   2.8   287  270    - 0.241  1530
 BE 3   2.0  84.46  0.100  0.210   106   90   2.5   314  270   68 0.241  1316
 BE 4   2.0  85.08  0.210  0.430   108   90   3.1   320  270   68 0.241  1915
 BE 5   2.0  85.83  0.220  0.460   108   90   3.5   321  260   66 0.241  1961
 BF 1   2.0  86.43  0.130  0.280   104   90   2.8   280  260    - 0.241  1467
 BF 2   2.0  87.10  0.160  0.340   108   90   3.0   296  260    - 0.241  1645
 BF 3   2.0  87.83  0.180  0.400   111   91   3.1   313  255   66 0.241  1765
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OUTPUT DATE - 08/18/80
       TIME - 11:59:16                                    KENVIRONS, INC.
-------------------------------------------------------   PROJECT NO. 80019
       BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
------------------------------------------------------------------------

PORT- SAMP  METER   DELTA    DELTA  TEMP TEMP TRAIN STACK BOX  BATH PROBE   VEL
POINT TIME   VOL      P        H     IN   OUT  VAC  TEMP  TEMP TEMP T DIA
      (MIN) (DCF) (I.H2O) (I.H2O)  (F)  (F) (I.HG)  (F)   (F)  (F)  (IN)  (FPM)

BF 4   2.0   88.55  0.200   0.420   112   91   3.3   313   255   66 0.241  1860
BF 5   2.0   89.34  0.220   0.460   112   91   3.5   312   255   66 0.241  1950
BG 1   2.0   90.10  0.250   0.560   110   92   4.9   252   255    - 0.241  1996
BG 2   2.0   91.01  0.230   0.490   109   92   3.8   298   255    - 0.241  1975
BG 3   2.0   91.83  0.260   0.550   110   92   3.9   306   255   64 0.241  2111
BG 4   2.0   92.65  0.260   0.550   112   92   3.9   306   255   64 0.241  2111
BG 5   2.0   93.57  0.320   0.680   113   92   4.2   301   255   64 0.241  2335
BH 1   2.0   94.51  0.300   0.670   107   92   4.2   190   255    - 0.241  2089
BH 2   2.0   95.49  0.330   0.740   110   92   4.6   239   255    - 0.241  2272
BH 3   2.0   96.50  0.350   0.790   108   92   4.9   292   250   60 0.241  2427
BH 4   2.0   97.42  0.270   0.600   109   92   4.1   298   250   60 0.241  2140
BH 5   2.0   98.44  0.370   0.840   110   92   5.2   301   250   60 0.241  2511
BI 1   2.0   99.40  0.340   0.760   106   92   4.5   251   250    - 0.241  2326
BI 2   2.0  100.44  0.370   0.790   114   93   4.9   288   250    - 0.241  2489
BI 3   2.0  101.49  0.390   0.820   114   93   4.9   291   255   61 0.241  2561
BI 4   2.0  102.55  0.390   0.820   116   93   4.9   289   255   61 0.241  2557
BI 5   2.0  103.65  0.470   1.000   118   93   5.7   287   255   61 0.241  2803
BJ 1   2.0  104.59  0.310   0.710   110   94   4.6   260   255    - 0.241  2235
BJ 2   2.0  105.60  0.340   0.710   114   94   4.7   281   255    - 0.241  2375
BJ 3   2.0  106.60  0.410   0.860   117   95   5.1   288   255   61 0.241  2620
BJ 4   2.0  107.71  0.410   0.860   118   95   5.1   287   255   61 0.241  2618
BJ 5   2.0  108.82  0.480   1.000   119   95   5.7   285   255   61 0.241  2829
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OUTPUT DATE - 08/18/80
       TIME - 11:59:16                                          KENVIRONS, INC.
                                                                PROJECT NO. 80019
------------------------------------------------------------------------------------
        BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
------------------------------------------------------------------------------------

                 PARTICULATE AND SO2 DATA WITH CALCULATED VALUES

                               RUN - STK006
                               DATE- 07/22/80

ATMOS  ATMOS  STACK   H2O    PARTIC  STACK   INIT    PERC PERC PERC PITOT
TEMP   PRES   PRES    COND   WT-TTL  AREA    VOL     O2   CO2  CO   TUBE
(DG.F) (I.HG) (I.HG)  (ML)   (MG)    (IN2)   (DCF)   DRY  DRY  DRY  COEF

 85    29.57  29.51  111.7    91.30  40828  631.44   7.7 11.1  0.0 0.840

    NBACL2        VT        VTB    VSOLN      VA
     (N)         (ML)       (ML)    (ML)     (ML)

  0.01023000     17.59      0.02   1000.0    10.0


PORT- SAMP  METER    DELTA    DELTA  TEMP TEMP TRAIN STACK BOX  BATH PROBE   VEL
POINT TIME   VOL       P        H     IN  OUT   VAC  TEMP  TEMP TEMP T DIA
     (MIN)  (DCF)  (I.H2O)  (I.H2O)  (F)  (F) (I.HG)  (F)  (F)   (F)  (IN)  (FPM)

A  1   3.0  632.41   0.500   0.300    87   84   3.8   177   230    65 0.172  2659
A  2   3.0  633.50   0.650   0.390   100   85   4.0   183   225    64 0.172  3046
A  3   3.0  634.75   0.850   0.520   105   85   5.0   183   225    64 0.172  3483
A  4   3.0  636.00   0.850   0.520   107   85   5.0   186   225    65 0.172  3491
A  5   3.0  637.23   0.800   0.480   110   86   5.0   184   225    69 0.172  3382
A  6   3.0  638.46   0.800   0.480   112   87   5.0   181   235    64 0.172  3374
A  7   3.0  639.70   0.800   0.480   114   88   5.0   178   240    64 0.172  3366
D  1   3.0  640.72   0.550   0.330   107   90   3.8   179   260    68 0.172  2793
D  2   3.0  641.82   0.650   0.390   113   90   4.0   179   250    64 0.172  3037
D  3   3.0  643.04   0.800   0.480   116   91   4.8   174   235    62 0.172  3356
D  4   3.0  644.31   0.850   0.520   118   92   5.0   177   220    60 0.172  3467
D  5   3.0  645.50   0.800   0.480   118   92   4.8   174   200    61 0.172  3356
D  6   3.0  646.77   0.800   0.480   120   93   4.8   172   220    61 0.172  3350
D  7   3.0  648.01   0.800   0.480   120   93   4.8   172   220    61 0.172  3350
C  1   3.0  648.93   0.450   0.270   111   95   3.4   169   230    68 0.172  2507
C  2   3.0  650.00   0.600   0.360   117   95   4.0   171   235    62 0.172  2899
C  3   3.0  651.13   0.700   0.420   118   95   4.3   173   240    62 0.172  3136
C  4   3.0  652.33   0.750   0.450   120   95   4.8   172   240    62 0.172  3244
C  5   3.0  653.56   0.800   0.480   121   95   5.0   171   240    62 0.172  3348
C  6   3.0  654.80   0.800   0.480   121   95   5.0   174   250    62 0.172  3356
C  7   3.0  656.05   0.750   0.450   121   95   4.9   174   250    62 0.172  3249
B  1   3.0  656.98   0.450   0.270   108   95   3.5   169   270    68 0.172  2507
B  2   3.0  658.05   0.650   0.390   118   95   4.2   177   270    63 0.172  3032
B  3   3.0  659.25   0.750   0.450   120   95   4.8   175   275    60 0.172  3252
B  4   3.0  660.47   0.800   0.480   121   95   5.0   175   270    60 0.172  3358
B  5   3.0  661.77   0.850   0.520   122   95   5.1   176   275    60 0.172  3464
B  6   3.0  663.02   0.800   0.480   122   95   5.0   176   290    60 0.172  3361
B  7   3.0  664.26   0.800   0.480   122   95   5.0   175   295    62 0.172  3358
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OUTPUT DATE - 08/27/80
       TIME - 14:33:45                                  KENVIRONS, INC.
-----------------------------------------------------   PROJECT NO. 80019
--------------------------------------------------------------------------
         BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
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                    PARTICULATE AND SO2 EMISSION DATA

    NAME    DESCRIPTION                   UNITS

            TITLE OF RUN                            ESPA06     ESPB06     STK006
            DATE OF RUN                           07/22/80   07/22/80   07/22/80
            TIME OF RUN                          1104-1338  1109-1416  1035-1216
    DN      PROBE TIP DIAMETER               IN      0.238      0.241      0.172
    TT      NET TIME OF RUN                 MIN      100.0      100.0       84.0
    NP      NUMBER OF SAMPLING POINTS                   50         50         28
    Y       DRY GAS METER CALIB. FACTOR             1.0245     1.0350     1.0145
    PB      BAROMETRIC PRES, LAB          IN.HG      29.79      29.79      29.79
    PBC     BAROMETRIC PRES, CONSOLE      IN.HG      29.74      29.74      29.57
    PM      AVG ORF PRES DROP            IN.H2O      0.607      0.613      0.440
    VM      VOL DRY GAS-METER COND          DCF      44.24      43.12      32.82
    TM      AVG GAS METER TEMP            DEG.F       89.4       98.7      103.2
    VMSTD   VOL DRY GAS-STD COND           DSCF      43.36      41.98      30.88
    VW      TOTAL H2O COLLECTED              ML      108.6      101.8      111.7
    VWV     VOL H2O VAPOR-STD COND          SCF       5.11       4.79       5.26
    PMOS    PERCENT MOISTURE BY VOLUME                10.5       10.2       14.5
    MD      MOLE FRACTION DRY GAS                    0.895      0.898      0.855
    PCO2    PERCENT CO2 BY VOLUME, DRY                11.1       11.5       11.1
    PO2     PERCENT O2 BY VOLUME, DRY                  8.1        8.0        7.7
    PCO     PERCENT CO BY VOLUME, DRY                  0.0        0.0        0.0
    PN2     PERCENT N2 BY VOLUME, DRY                 80.8       80.5       81.2
    MWD     MOLECULAR WT-DRY STK GAS                 30.10      30.16      30.08
    MW      MOLECULAR WT-STK GAS                     28.83      28.92      28.32
    CP      PITOT TUBE COEFFICIENT                   0.840      0.840      0.840
    DPS     AVG SQRT STK VEL HEAD        IN.H2O      0.546      0.523      0.851
    TS      AVG STACK TEMPERATURE         DEG.F      298.0      300.8      175.9
    PS      STACK PRESSURE, ABSOLUTE      IN.HG      28.67      28.67      29.51
    VS      AVG STACK GAS VELOCITY          FPM       2250       2160       3200
    AS      STACK AREA                      IN2      33618      33618      40828
    QS      STK FLOWRATE, DRY, STD        DSCFM     314000     301000     635000
    QA      ACTUAL STACK FLOWRATE          ACFM     526000     504000     907000
    PERI    PERCENT ISOKINETIC                       104.3      102.8      101.8
    MT      PARTICULATE WT-TOTAL             MG    1212.20    1788.20      91.30
    CAN     PART. LOAD-TTL, STD         GR/DSCF      0.431      0.657      0.046
    C       PART. LOAD-TTL, STD         LB/DSCF  .00006160  .00009390  .00000651
    CAT     PART. LOAD-TTL, STK          GR/ACF      0.258      0.392      0.032
    CAW     PART. EMIS-TOTAL              LB/HR  1161.2044  1695.5126   248.0000
    E       EMISSION RATE              LB/MMBTU     0.9900     1.4900     0.1020
    F       F FACTOR                 DSCF/MMBTU       9820       9820       9820
    SCONC   SO2, CONC., STD             LB/DSCF   3.90E-04   4.11E-04   4.11E-05
    SCONCA  SO2, CONC., STK              LB/ACF   2.33E-04   2.45E-04   2.88E-05
    SCHR    SO2 EMISSION RATE             LB/HR   7343.135   7420.226   1564.931
    SCMM    SO2 EMISSION RATE          LB/MMBTU      6.260      6.540      0.641
    SCPPM   SO2, CONC., STD                 PPM       2350       2480        248
    SCPPMA  SO2, CONC., STK                 PPM       2100       2230        212
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OUTPUT DATE - 08/18/80
       TIME - 12:00:24                                       KENVIRONS, INC.
                                                             PROJECT NO. 80019
------------------------------------------------------------------------------
        BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
------------------------------------------------------------------------------

              PARTICULATE AND SO2 DATA WITH CALCULATED VALUES

                              RUN - ESPA07
                              DATE- 07/23/80

ATMOS  ATMOS  STACK   H2O    PARTIC  STACK  INIT    PERC PERC PERC PITOT
TEMP   PRES   PRES    COND   WT-TTL  AREA   VOL     O2   CO2  CO   TUBE
(DG.F) (I.HG) (I.HG)  (ML)   (MG)    (IN2)  (DCF)   DRY  DRY  DRY  COEF

  80   29.75  28.80   90.0   718.50  33618  430.96  7.3 10.7  0.0 0.840

     NBACL2       VT       VTB    VSOLN     VA
      (N)        (ML)     (ML)    (ML)     (ML)

  0.01023000     19.01     0.02   1000.0    1.0


 PORT- SAMP  METER   DELTA    DELTA  TEMP TEMP TRAIN STACK BOX  BATH PROBE   VEL
 POINT TIME   VOL      P        H     IN  OUT   VAC  TEMP  TEMP TEMP T DIA
       (MIN) (DCF) (I.H2O)  (I.H2O)  (F)  (F) (I.HG)  (F)  (F)  (F)  (IN)  (FPM)

 AA 1   2.0  431.81  0.260   0.500    82   81   4.0   284  240    - 0.238  2078
 AA 2   2.0  432.76  0.350   0.670    85   82   4.2   309  245    - 0.238  2451
 AA 3   2.0  433.67  0.300   0.580    87   83   4.0   330  245   60 0.238  2300
 AA 4   2.0  434.60  0.340   0.620    90   83   4.1   336  245   62 0.238  2458
 AA 5   2.0  435.57  0.390   0.710    91   84   4.4   336  250   61 0.238  2632
 AB 1   2.0  436.39  0.250   0.480    89   85   3.4   267  255    - 0.238  2014
 AB 2   2.0  437.36  0.390   0.750    94   86   4.5   298  255    - 0.238  2569
 AB 3   2.0  438.36  0.380   0.740    95   86   4.5   330  255   62 0.238  2588
 AB 4   2.0  439.29  0.330   0.600    96   87   4.0   338  255   58 0.238  2424
 AB 5   2.0  440.26  0.390   0.710    97   88   4.4   334  255   58 0.238  2629
 AC 1   2.0  441.10  0.270   0.570    95   88   3.9   195  260    - 0.238  1987
 AC 2   2.0  441.99  0.290   0.560    97   89   3.9   314  260    - 0.238  2238
 AC 3   2.0  442.87  0.290   0.560    98   90   3.9   327  255   62 0.238  2257
 AC 4   2.0  443.72  0.270   0.490    99   90   3.6   335  255   62 0.238  2189
 AC 5   2.0  444.57  0.300   0.540    99   90   3.8   340  260   62 0.238  2314
 AD 1   2.0  445.27  0.180   0.350    95   90   3.0   299  260    - 0.238  1746
 AD 2   2.0  446.05  0.220   0.430    98   91   3.2   318  260    - 0.238  1954
 AD 3   2.0  446.83  0.240   0.440    99   92   3.2   332  260   64 0.238  2060
 AD 4   2.0  447.60  0.230   0.420   100   92   3.2   329  260   64 0.238  2013
 AD 5   2.0  448.41  0.260   0.480   101   92   3.5   321  265   64 0.238  2129
 AE 1   2.0  448.81  0.060   0.120    94   92   0.0   268  270    - 0.238   987
 AE 2   2.0  449.19  0.050   0.100    94   93   0.0   293  260    - 0.238   917
 AE 3   2.0  449.64  0.090   0.170    96   94   2.1   317  255   66 0.238  1249
 AE 4   2.0  450.31  0.170   0.330    99   94   2.9   323  265   68 0.238  1724
 AE 5   2.0  450.98  0.170   0.330    99   93   2.9   322  265   66 0.238  1723
 AF 1   2.0  451.59  0.130   0.260    96   93   2.5   291  265    - 0.238  1476
 AF 2   2.0  452.20  0.130   0.260    98   94   2.5   311  260    - 0.238  1496
 AF 3   2.0  452.68  0.070   0.140    96   94   0.0   312  260   66 0.238  1098
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OUTPUT DATE - 08/18/80                                  KENVIRONS, INC.
       TIME - 12:00:24                                  PROJECT NO. 80019
-------------------------------------------------------------------------------
        BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
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PORT- SAMP  METER    DELTA    DELTA TEMP TEMP TRAIN STACK  BOX BATH PROBE   VEL
POINT TIME   VOL       P        H    IN   OUT   VAC  TEMP TEMP TEMP T DIA
      (MIN) (DCF) (I.H2O) (I.H2O)  (F)  (F) (I.HG)   (F)  (F)  (F)  (IN) (FPM)

AF 4   2.0  453.36   0.190    0.380  100   94   3.0   315  260   68 0.238  1813
AF 5   2.0  454.10   0.200    0.390  100   94   3.1   317  260   63 0.238  1862
AG 1   2.0  454.75   0.150    0.300   97   93   2.8   285  260    - 0.238  1579
AG 2   2.0  455.53   0.230    0.450  100   94   3.3   303  260    - 0.238  1979
AG 3   2.0  456.35   0.250    0.480  101   94   3.4   308  260   66 0.238  2070
AG 4   2.0  457.18   0.260    0.500  102   94   3.5   306  260   64 0.238  2108
AG 5   2.0  458.07   0.300    0.580  103   94   4.0   302  265   65 0.238  2259
AH 1   2.0  458.87   0.240    0.460   98   93   3.4   276  260    - 0.238  1986
AH 2   2.0  459.75   0.300    0.580  101   94   4.0   300  260    - 0.238  2256
AH 3   2.0  460.69   0.330    0.640  103   94   4.2   305  260   68 0.238  2374
AH 4   2.0  461.55   0.260    0.500  103   95   3.7   306  260   65 0.238  2108
AH 5   2.0  462.46   0.320    0.620  104   95   4.1   305  260   64 0.238  2337
AI 1   2.0  463.45   0.370    0.720  101   94   4.8   276  255    - 0.238  2465
AI 2   2.0  464.46   0.380    0.740  103   95   4.8   292  255    - 0.238  2525
AI 3   2.0  465.47   0.380    0.740  104   95   4.8   297  250   60 0.238  2534
AI 4   2.0  466.49   0.390    0.760  104   95   4.9   297  250   60 0.238  2567
AI 5   2.0  467.59   0.480    0.940  105   95   5.8   295  255   61 0.238  2844
AJ 1   2.0  468.58   0.370    0.720   98   94   4.8   269  270    - 0.238  2454
AJ 2   2.0  469.62   0.410    0.800  102   95   5.0   291  270    - 0.238  2621
AJ 3   2.0  470.67   0.420    0.810  103   95   5.0   291  265   62 0.238  2653
AJ 4   2.0  471.71   0.410    0.800  104   96   5.0   291  265   62 0.238  2621
AJ 5   2.0  472.82   0.490    0.950  105   96   5.8   288  270   62 0.238  2860
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OUTPUT DATE - 08/18/80                                  KENVIRONS, INC.
       TIME - 12:00:25                                  PROJECT NO. 80019
-------------------------------------------------------------------------------
          BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
-------------------------------------------------------------------------------

                 PARTICULATE AND SO2 DATA WITH CALCULATED VALUES

                               RUN - ESPB07
                               DATE- 07/23/80

ATMOS  ATMOS  STACK   H2O    PARTIC  STACK  INIT     PERC PERC PERC PITOT
TEMP   PRES   PRES    COND   WT-TTL  AREA   VOL      O2   CO2  CO   TUBE
(DG.F) (I.HG) (I.HG)  (ML)   (MG)    (IN2)  (DCF)    DRY  DRY  DRY  COEF

 85    29.75  28.82   80.8   921.70  33618  115.30   7.8  11.5  0.0 0.840

    NBACL2      VT       VTB    VSOLN      VA
     (N)       (ML)      (ML)    (ML)     (ML)

 0.01023000    17.57     0.02   1000.0     1.0


PORT- SAMP  METER   DELTA    DELTA  TEMP TEMP TRAIN STACK BOX BATH PROBE   VEL
POINT TIME  VOL      P        H     IN   OUT  VAC   TEMP TEMP TEMP T DIA
      (MIN) (DCF) (I.H2O) (I.H2O)  (F)  (F) (I.HG)  (F)  (F)  (F)  (IN)  (FPM)

BA 1   2.0 116.26  0.260   0.590    98   94   3.7   259  225    - 0.241  2036
BA 2   2.0 117.14  0.270   0.560   104   95   3.4   303  225    - 0.241  2137
BA 3   2.0 118.04  0.280   0.580   107   95   3.7   314  225   68 0.241  2192
BA 4   2.0 118.97  0.280   0.580   110   96   3.8   320  245   67 0.241  2200
BA 5   2.0 119.90  0.320   0.640   113   98   3.9   320  245   67 0.241  2352
BB 1   2.0 120.81  0.260   0.590   114   98   3.6   259  250    - 0.241  2036
BB 2   2.0 121.70  0.250   0.530   115   98   3.6   292  255    - 0.241  2042
BB 3   2.0 122.59  0.270   0.560   118   98   3.5   316  255   68 0.241  2155
BB 4   2.0 123.47  0.260   0.520   120   99   3.5   323  255   68 0.241  2124
BB 5   2.0 124.37  0.310   0.620   121   99   2.9   323  260   68 0.241  2320
BC 1   2.0 125.17  0.180   0.420   117   99   3.0   258  255    - 0.241  1693
BC 2   2.0 126.09  0.260   0.560   120  100   3.6   293  255    - 0.241  2083
BC 3   2.0 126.93  0.230   0.480   123  101   3.4   309  255   65 0.241  1980
BC 4   2.0 127.78  0.200   0.420   124  101   3.2   318  255   65 0.241  1857
BC 5   2.0 128.52  0.220   0.450   125  102   3.4   321  255   65 0.241  1952
BD 1   2.0 129.38  0.150   0.360   120  102   3.0   250  255    - 0.241  1537
BD 2   2.0 130.02  0.160   0.340   124  103   3.0   292  255    - 0.241  1633
BD 3   2.0 130.80  0.180   0.400   126  103   3.0   305  260   68 0.241  1747
BD 4   2.0 131.57  0.180   0.400   126  104   3.0   310  260   67 0.241  1753
BD 5   2.0 132.34  0.200   0.420   127  104   3.1   306  260   67 0.241  1843
BE 1   2.0 132.68  0.050   0.110   122  104   1.5   246  260    - 0.241   885
BE 2   2.0 133.18  0.090   0.200   124  104   2.1   265  260    - 0.241  1203
BE 3   2.0 133.76  0.100   0.210   125  105   2.3   289  250   66 0.241  1289
BE 4   2.0 134.35  0.120   0.250   126  104   2.3   300  250   66 0.241  1422
BE 5   2.0 135.07  0.160   0.340   127  104   3.0   303  250   66 0.241  1645
BF 1   2.0 135.48  0.060   0.130   122  104   2.0   255  250    - 0.241   975
BF 2   2.0 136.00  0.090   0.200   124  104   2.2   273  250    - 0.241  1209
BF 3   2.0 136.55  0.090   0.180   126  104   2.2   289  250   66 0.241  1222
```

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OUTPUT DATE - 08/18/80
       TIME - 12:00:25                                          KENVIRONS, INC.
-------------------------------------------------------------   PROJECT NO. 80019
-----------------------------------------------------------------------------------
         BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
-----------------------------------------------------------------------------------

PORT- SAMP  METER    DELTA    DELTA  TEMP TEMP TRAIN STACK BOX BATH PROBE    VEL
POINT TIME  VOL        P        H     IN   OUT  VAC  TEMP  TEMP TEMP T DIA
      (MIN) (DCF) (I.H20) (I.H20)   (F)  (F) (I.HG)  (F)   (F)  (F)  (IN)  (FPM)

BF 4   2.0 137.16  0.120   0.250   126  104   2.4   295  250   66 0.241  1417
BF 5   2.0 137.80  0.130   0.270   126  104   2.7   295  250   66 0.241  1475
BG 1   2.0 138.49  0.150   0.340   120  103   2.9   254  250    - 0.241  1541
BG 2   2.0 139.20  0.150   0.340   123  103   2.9   269  250    - 0.241  1557
BG 3   2.0 139.96  0.180   0.380   125  103   3.0   289  250   62 0.241  1729
BG 4   2.0 140.78  0.180   0.380   126  103   3.0   289  250   62 0.241  1729
BG 5   2.0 141.55  0.210   0.440   126  103   3.1   287  250   62 0.241  1865
BH 1   2.0 142.33  0.180   0.400   121  103   3.0   227  250    - 0.241  1656
BH 2   2.0 143.12  0.210   0.480   124  103   3.3   252  250    - 0.241  1821
BH 3   2.0 143.89  0.220   0.480   126  103   3.4   276  250   60 0.241  1895
BH 4   2.0 144.75  0.180   0.380   126  103   3.0   281  250   60 0.241  1720
BH 5   2.0 145.55  0.240   0.500   126  103   3.4   281  250   60 0.241  1986
BI 1   2.0 146.50  0.250   0.570   120  103   3.6   253  260    - 0.241  1988
BI 2   2.0 147.36  0.250   0.570   125  103   3.7   276  260    - 0.241  2020
BI 3   2.0 148.29  0.270   0.580   126  103   4.0   278  255   60 0.241  2102
BI 4   2.0 149.23  0.270   0.580   126  103   4.0   276  255   60 0.241  2099
BI 5   2.0 150.21  0.320   0.670   128  103   4.2   274  255   60 0.241  2282
BJ 1   2.0 151.10  0.250   0.580   128  102   3.6   253  255   55 0.241  1988
BJ 2   2.0 152.01  0.240   0.550   124  102   3.8   277  255   55 0.241  1980
BJ 3   2.0 153.00  0.300   0.640   126  102   4.0   280  255   55 0.241  2218
BJ 4   2.0 153.98  0.300   0.640   126  102   4.0   279  255   55 0.241  2217
BJ 5   2.0 155.00  0.380   0.840   127  102   4.7   277  255   55 0.241  2492
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ʳPUT DATE - 08/18/80
     TIME - 12:00:25                                          KENVIRONS, INC.
                                                              PROJECT NO. 80019
-------------------------------------------------------------------------------
        BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
-------------------------------------------------------------------------------

            PARTICULATE AND SO2 DATA WITH CALCULATED VALUES

                           RUN - STK007
                           DATE- 07/23/80

MOS  ATMOS  STACK   H2O    PARTIC  STACK  INIT     PERC PERC  ERC PITOT
4P   PRES   PRES    COND   WT-TTL  AREA   VOL      O2   CO2   CO   TUBE
3.F) (I.HG) (I.HG)  (ML)   (MG)    (IN2)  (DCF)    DRY  DRY   DRY  COEF

87   29.58  29.52   93.2    81.10  40828  670.28   7.8 10.5   0.1 0.840

   NBACL2       VT        VTB    VSOLN      VA
    (N)        (ML)       (ML)    (ML)     (ML)

0.01023000     8.69       0.01   1000.0   10.0


ORT- SAMP  METER   DELTA   DELTA  TEMP TEMP TRAIN STACK BOX BATH PROBE  VEL
3INT TIME  VOL       P       H     IN   OUT  VAC  TEMP TEMP TEMP T DIA
     (MIN) (DCF) (I.H2O) (I.H2O) (F)  (F) (I.HG)  (F)  (F)  (F)  (IN) (FPM)

  1   3.0  670.91  0.250  0.145   92   87   2.4   171  270   75 0.172  1870
  2   3.0  671.85  0.550  0.320   98   87   3.2   178  270   74 0.172  2789
  3   3.0  672.90  0.600  0.350  100   87   3.5   182  270   72 0.172  2922
  4   3.0  674.00  0.650  0.380  102   87   3.5   177  270   71 0.172  3029
  5   3.0  675.10  0.650  0.380  100   87   3.6   171  275   72 0.172  3015
  6   3.0  676.21  0.650  0.380  101   88   3.7   161  275   72 0.172  2991
  7   3.0  677.32  0.650  0.380  102   88   3.8   160  280   73 0.172  2989
  1   3.0  678.11  0.400  0.230   96   91   2.0   148  290   65 0.172  2322
  2   3.0  679.12  0.600  0.350  108   90   3.2   171  290   67 0.172  2897
  3   3.0  680.18  0.650  0.380  112   91   3.3   170  270   68 0.172  3013
  4   3.0  681.29  0.700  0.410  116   91   3.5   166  265   69 0.172  3117
  5   3.0  682.46  0.750  0.440  118   92   3.8   171  265   62 0.172  3239
  6   3.0  683.65  0.800  0.470  119   92   4.0   169  270   61 0.172  3340
  7   3.0  684.85  0.800  0.470  120   93   4.0   176  275   60 0.172  3358
  1   3.0  685.74  0.450  0.250  108   96   3.0   173  275   69 0.172  2513
  2   3.0  686.66  0.500  0.290  115   95   3.1   178  260   69 0.172  2659
  3   3.0  687.69  0.600  0.350  117   95   3.3   181  250   69 0.172  2920
  4   3.0  688.78  0.650  0.380  120   95   3.5   177  245   72 0.172  3029
  5   3.0  689.87  0.650  0.380  120   95   3.5   176  260   70 0.172  3027
  6   3.0  690.97  0.650  0.380  121   95   3.5   170  280   68 0.172  3013
  7   3.0  692.00  0.650  0.380  121   95   3.5   172  310   62 0.172  3018
  1   3.0  692.90  0.400  0.230  110   96   3.0   166  230   67 0.172  2356
  2   3.0  693.88  0.550  0.320  116   96   3.2   169  225   66 0.172  2769
  3   3.0  695.00  0.700  0.410  118   96   3.8   174  230   63 0.172  3136
  4   3.0  696.14  0.700  0.410  120   96   3.8   173  225   64 0.172  3134
  5   3.0  697.32  0.750  0.440  121   96   3.9   168  235   68 0.172  3231
  6   3.0  698.56  0.750  0.440  122   96   4.0   164  245   68 0.172  3221
  7   3.0  699.71  0.750  0.440  122   96   4.8   168  245   68 0.172  3231
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OUTPUT DATE - 08/27/80
       TIME - 14:34:15                                     KENVIRONS, INC.
                                                           PROJECT NO. 80019
----------------------------------------------------------------------------
      BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
----------------------------------------------------------------------------

                 PARTICULATE AND SO2 EMISSION DATA

    NAME   DESCRIPTION                  UNITS

           TITLE OF RUN                             ESPA07     ESPB07     STK007
           DATE OF RUN                            07/23/80   07/23/80   07/23/80
           TIME OF RUN                           1620-1832  1620-1823  1620-1814
    DN     PROBE TIP DIAMETER              IN        0.238      0.241      0.172
    TT     NET TIME OF RUN                MIN        100.0      100.0       84.0
    NP     NUMBER OF SAMPLING POINTS                    50         50         28
    Y      DRY GAS METER CALIB. FACTOR              1.0230     1.0320     1.0115
    PB     BAROMETRIC PRES, LAB         IN.HG        29.80      29.80      29.80
    PBC    BAROMETRIC PRES, CONSOLE     IN.HG        29.75      29.75      29.58
    PM     AVG ORF PRES DROP           IN.H2O        0.535      0.450      0.364
    VM     VOL DRY GAS-METER COND         DCF        41.87      39.70      29.43
    TM     AVG GAS METER TEMP           DEG.F         94.7      111.8      102.2
    VMSTD  VOL DRY GAS-STD COND          DSCF        40.58      37.65      27.66
    VW     TOTAL H2O COLLECTED             ML         90.0       80.8       93.2
    VWV    VOL H2O VAPOR-STD COND         SCF         4.24       3.80       4.39
    PMOS   PERCENT MOISTURE BY VOLUME                  9.5        9.2       13.7
    MD     MOLE FRACTION DRY GAS                     0.905      0.908      0.863
    PCO2   PERCENT CO2 BY VOLUME, DRY                 10.7       11.5       10.5
    PO2    PERCENT O2 BY VOLUME, DRY                   7.3        7.8        7.8
    PCO    PERCENT CO BY VOLUME, DRY                   0.0        0.0        0.1
    PN2    PERCENT N2 BY VOLUME, DRY                  82.0       80.7       81.5
    MWD    MOLECULAR WT-DRY STK GAS                  30.00      30.15      30.00
    MW     MOLECULAR WT-STK GAS                      28.87      29.04      28.36
    CP     PITOT TUBE COEFFICIENT                    0.840      0.840      0.840
    DPS    AVG SQRT STK VEL HEAD       IN.H2O        0.516      0.449      0.785
    TS     AVG STACK TEMPERATURE        DEG.F        304.5      284.6      170.7
    PS     STACK PRESSURE, ABSOLUTE     IN.HG        28.80      28.82      29.52
    VS     AVG STACK GAS VELOCITY         FPM         2130       1820       2930
    AS     STACK AREA                     IN2        33618      33618      40828
    QS     STK FLOWRATE, DRY, STD       DSCFM       300000     264000     593000
    QA     ACTUAL STACK FLOWRATE         ACFM       498000     426000     832000
    PERI   PERCENT ISOKINETIC                        102.4      105.0       97.6
    MT     PARTICULATE WT-TOTAL            MG       718.50     921.70      81.10
    CAN    PART. LOAD-TTL, STD        GR/DSCF        0.273      0.378      0.045
    C      PART. LOAD-TTL, STD        LB/DSCF    .00003900  .00005400  .00000646
    CAT    PART. LOAD-TTL, STK         GR/ACF        0.164      0.234      0.032
    CAW    PART. EMIS-TOTAL             LB/HR     701.0000   856.0000   230.0000
    E      EMISSION RATE             LB/MMBTU       0.5890     0.8470     0.1020
    F      F FACTOR                DSCF/MMBTU         9820       9820       9820
    SCONC  SO2, CONC., STD            LB/DSCF    3.38E-04   3.37E-04   2.27E-05
    SCONCA SO2, CONC., STK             LB/ACF    2.03E-04   2.09E-04   1.62E-05
    SCHR   SO2 EMISSION RATE            LB/HR    6073.866   5338.111    807.000
    SCMM   SO2 EMISSION RATE         LB/MMBTU       5.100      5.290      0.357
    SCPPM  SO2, CONC., STD                PPM        2040       2030        137
    SCPPMA SO2, CONC., STK                PPM        1850       1840        118
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UTPUT DATE - 08/18/80                                    KENVIRONS, INC.
      TIME - 12:00:37                                    PROJECT NO. 80019
--------------------------------------------------------------------------
        BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
--------------------------------------------------------------------------

              PARTICULATE AND SO2 DATA WITH CALCULATED VALUES

                             RUN - ESPA08
                             DATE- 07/24/80

.THMOS  ATMOS  STACK   H2O   PARTIC  STACK  INIT    PERC PERC PERC PITOT
TEMP    PRES   PRES    COND  WT-TTL  AREA   VOL     O2   CO2  CO   TUBE
 DG.F) (I.HG) (I.HG)   (ML)   (MG)   (IN2)  (DCF)   DRY  DRY  DRY  COEF

  80   29.77  28.72   107.5  808.50  33618  478.63  7.3  11.2  0.0 0.840

      NBACL2       VT       VTB    VSOLN     VA
       (N)        (ML)      (ML)    (ML)    (ML)

  0.01023000      21.06     0.03   1000.0    1.0


PORT- SAMP  METER   DELTA    DELTA  TEMP TEMP TRAIN STACK BOX BATH PROBE  VEL
POINT TIME   VOL      P        H     IN  OUT   VAC  TEMP TEMP TEMP T DIA
      (MIN) (DCF) (I.H2O) (I.H2O)  (F)  (F) (I.HG)  (F)  (F)  (F)  (IN) (FPM)

 AJ 1   2.0  479.68  0.390   0.810   83   82   6.0   268  285    - 0.238  2523
 AJ 2   2.0  480.75  0.450   0.870   86   83   5.8   288  275    - 0.238  2747
 AJ 3   2.0  481.83  0.450   0.870   88   83   5.8   287  270   60 0.238  2746
 AJ 4   2.0  482.90  0.440   0.850   89   83   5.7   288  270   60 0.238  2717
 AJ 5   2.0  448.05  0.520   1.000   91   84   6.2   286  265   58 0.238  2949
 AI 1   2.0  485.03  0.380   0.740   87   84   5.0   271  265    - 0.238  2496
 AI 2   2.0  486.06  0.420   0.810   91   84   5.2   288  260    - 0.238  2654
 AI 3   2.0  487.11  0.430   0.830   92   85   5.3   293  255   58 0.238  2695
 AI 4   2.0  488.15  0.420   0.810   94   85   5.2   292  255   58 0.238  2661
-AI 5   2.0  489.26  0.480   0.940   95   85   6.0   292  255   58 0.238  2845
 AH 1   2.0  490.15  0.280   0.590   92   86   4.2   277  250    - 0.238  2151
 AH 2   2.0  491.06  0.320   0.620   94   86   4.3   293  250    - 0.238  2325
 AH 3   2.0  492.02  0.360   0.700   96   87   4.9   300  250   58 0.238  2477
 AH 4   2.0  492.94  0.310   0.600   96   87   4.3   298  250   57 0.238  2296
 AH 5   2.0  493.91  0.390   0.750   98   88   5.1   300  255   56 0.238  2578
 AG 1   2.0  494.63  0.190   0.370   93   88   3.3   290  250    - 0.238  1788
-AG 2   2.0  495.47  0.280   0.540   95   88   4.1   311  250    - 0.238  2200
 AG 3   2.0  496.33  0.280   0.540   97   89   4.1   315  240   60 0.238  2206
 AG 4   2.0  497.21  0.290   0.570   98   89   4.2   311  240   58 0.238  2239
-AG 5   2.0  498.12  0.320   0.620   99   89   4.5   305  245   58 0.238  2343
 AF 1   2.0  498.73  0.140   0.270   94   89   3.0   300  245    - 0.238  1545
 AF 2   2.0  499.38  0.160   0.310   95   90.  3.0   311  245    - 0.238  1663
 AF 3   2.0  499.89  0.090   0.170   94   90   2.2   317  235   60 0.238  1252
 AF 4   2.0  500.62  0.220   0.420   97   90   3.6   317  235   60 0.238  1958
 AF 5   2.0  501.41  0.240   0.460   99   90   3.9   320  250   60 0.238  2049
 AE 1   2.0  501.82  0.070   0.130   92   91   2.0   277  255    - 0.238  1076
-AE 2   2.0  502.23  0.060   0.120   93   91   2.0   303  255    - 0.238  1013
 AE 3   2.0  502.73  0.100   0.190   95   92   2.3   323  245   68 0.238  1325
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OUTPUT DATE - 08/18/80
       TIME - 12:00:37                                               KENVIRONS, INC.
---------------------------------------------------------------------PROJECT NO. 80019
           BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
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PORT- SAMP  METER    DELTA    DELTA  TEMP TEMP  TRAIN STACK  BOX BATH PROBE    VEL
POINT TIME   VOL       P        H     IN   OUT   VAC   TEMP TEMP TEMP T DIA
      (MIN)  (DCF) (I.H2O)  (I.H2O)  (F)  (F) (I.HG)   (F)  (F)  (F)  (IN)  (FPM)
AE 4   2.0  503.43  0.190   0.370    98   92    3.3   329  250   65 0.238  1834
AE 5   2.0  504.16  0.200   0.390    99   92    3.5   329  260   60 0.238  1881
AD 1   2.0  504.93  0.230   0.440    97   92    3.8   303  270    - 0.238  1984
AD 2   2.0  505.75  0.260   0.500   100   92    4.0   321  265    - 0.238  2134
AD 3   2.0  506.59  0.270   0.520   101   93    4.1   339  250   60 0.238  2199
AD 4   2.0  507.44  0.270   0.520   102   93    4.1   336  250   60 0.238  2195
AD 5   2.0  508.32  0.310   0.570   102   93    4.4   325  265   58 0.238  2336
AC 1   2.0  509.17  0.250   0.520    99   94    4.1   286  275    - 0.238  2045
AC 2   2.0  510.11  0.340   0.700   102   94    5.0   318  270    - 0.238  2436
AC 3   2.0  511.07  0.340   0.660   103   94    5.0   333  270   58 0.238  2459
AC 4   2.0  511.97  0.300   0.580   103   94    4.5   339  270   58 0.238  2318
AC 5   2.0  512.90  0.330   0.640   103   94    4.9   344  275   56 0.238  2439
AB 1   2.0  513.87  0.350   0.680    99   93    4.9   282  275    - 0.238  2413
AB 2   2.0  514.92  0.450   0.870   103   93    5.9   306  275    - 0.238  2780
AB 3   2.0  515.99  0.430   0.830   104   94    5.8   337  260   58 0.238  2772
AB 4   2.0  517.01  0.380   0.740   104   95    5.2   345  260   56 0.238  2619
AB 5   2.0  518.05  0.440   0.800   105   95    5.7   344  270   58 0.238  2817
AA 1   2.0  518.94  0.290   0.570   101   95    4.2   291  275    - 0.238  2210
AA 2   2.0  519.94  0.410   0.790   103   95    5.7   315  275    - 0.238  2669
AA 3   2.0  520.95  0.370   0.720   104   95    5.2   337  270   58 0.238  2572
AA 4   2.0  521.30  0.380   0.700   105   95    5.2   343  270   54 0.238  2616
AA 5   2.0  522.94  0.410   0.740   105   95    5.3   344  270   55 0.238  2719
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OUTPUT DATE - 08/18/80
       TIME - 12:00:38                                       KENVIRONS, INC.
                                                             PROJECT NO. 80019
---------------------------------------------------------------------------------
          BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG$E CANE RUN NO.6
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                  PARTICULATE AND SO2 DATA WITH CALCULATED VALUES

                              RUN - ESPB08
                              DATE- 07/24/80

ATMOS  ATMOS  STACK   H2O    PARTIC  STACK  INIT    PERC PERC PERC PITOT
TEMP   PRES   PRES    COND   WT-TTL  AREA   VOL     O2   CO2  CO   TUBE
(DG.F) (I.HG) (I.HG)  (ML)   (MG)    (IN2)  (DCF)   DRY  DRY  DRY  COEF

  80   29.77  28.65   99.3   805.60  33618  161.00  7.2 11.5  0.0 0.840

     NBACL2        VT        VTB    VSOLN      VA
      (N)         (ML)       (ML)    (ML)     (ML)

 0.01023000      19.68      0.02   1000.0     1.0


PORT- SAMP  METER   DELTA    DELTA  TEMP TEMP TRAIN  STACK BOX  BATH PROBE   VEL
POINT TIME   VOL      P        H     IN  OUT   VAC   TEMP  TEMP TEMP T DIA
      (MIN) (DCF)  (I.H2O)  (I.H2O) (F)  (F) (I.HG)  (F)   (F)  (F)   (IN)  (FPM)

BA 1   2.0  161.90  0.260   0.570   90   87    4.7   258   280    - 0.241   2046
BA 2   2.0  162.84  0.320   0.670   96   87    4.9   314   280    - 0.241   2357
BA 3   2.0  163.78  0.330   0.650  100   87    5.0   331   275   66 0.241   2419
BA 4   2.0  164.70  0.320   0.630  104   88    4.9   336   275   66 0.241   2390
BA 5   2.0  165.65  0.370   0.720  106   88    5.1   334   275   66 0.241   2567
BB 1   2.0  166.60  0.330   0.720  104   90    5.1   276   275    - 0.241   2334
BB 2   2.0  167.56  0.310   0.650  108   90    4.9   314   275    - 0.241   2320
BB 3   2.0  168.50  0.330   0.650  110   90    4.7   326   275   60 0.241   2412
BB 4   2.0  169.30  0.310   0.620  112   90    4.9   333   275   60 0.241   2348
BB 5   2.0  170.30  0.360   0.710  114   91    5.3   332   255   60 0.241   2529
BC 1   2.0  171.17  0.240   0.540  111   92    4.3   266   270    - 0.241   1977
BC 2   2.0  172.10  0.310   0.660  115   93    5.0   298   270    - 0.241   2296
BC 3   2.0  173.00  0.290   0.610  117   94    4.9   324   270   62 0.241   2258
BC 4   2.0  173.84  0.260   0.500  118   95    4.2   330   270   62 0.241   2146
BC 5   2.0  174.70  0.300   0.590  119   95    4.8   333   270   63 0.241   2310
BD 1   2.0  175.49  0.210   0.460  112   96    4.0   245   270    - 0.241   1822
BD 2   2.0  176.27  0.210   0.440  117   97    4.0   299   270    - 0.241   1891
BD 3   2.0  177.08  0.240   0.500  119   97    4.3   315   265   66 0.241   2042
BD 4   2.0  177.90  0.230   0.480  120   97    4.3   324   265   66 0.241   2011
BD 5   2.0  178.73  0.250   0.500  121   97    4.2   324   265   66 0.241   2097
BE 1   2.0  179.21  0.090   0.200  118   98    2.7   241   265    - 0.241   1189
BE 2   2.0  179.84  0.140   0.290  120   98    3.1   272   265    - 0.241   1516
BE 3   2.0  180.46  0.140   0.290  121   99    3.1   298   265   68 0.241   1543
BE 4   2.0  181.10  0.170   0.350  122  100    3.6   319   265   67 0.241   1723
BE 5   2.0  181.83  0.190   0.390  124  100    3.7   319   265   67 0.241   1822
BF 1   2.0  182.34  0.110   0.230  120  100    2.7   274   265    - 0.241   1346
BF 2   2.0  182.98  0.140   0.290  122  100    3.2   299   265    - 0.241   1544
BF 3   2.0  183.60  0.160   0.330  124  101    3.5   306   265   66 0.241   1658
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ITPUT DATE - 08/18/80
      TIME - 12:00:38                                            KENVIRONS, INC.
                                                                 PROJECT NO. 80019
------------------------------------------------------------------------------------
      BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
------------------------------------------------------------------------------------

ORT- SAMP  METER    DELTA    DELTA  TEMP TEMP  TRAIN STACK  BOX BATH PROBE    VEL
 INT TIME   VOL       P        H     IN   OUT   VAC   TEMP TEMP TEMP T DIA
    (MIN)  (DCF) (I.H2O)  (I.H2O)  (F)  (F) (I.HG)   (F)  (F)  (F)  (IN)  (FPM)

- 4   2.0  184.35   0.180   0.380  124  101    3.9   306  265   66 0.241   1758
  5   2.0  185.06   0.190   0.410  125  101    3.9   306  265   66 0.241   1807
  1   2.0  185.83   0.220   0.480  119  102    4.1   255  265    - 0.241   1878
  2   2.0  186.62   0.220   0.480  121  102    4.1   264  265    - 0.241   1890
  3   2.0  187.40   0.240   0.500  124  102    4.2   297  265   62 0.241   2018
  4   2.0  188.29   0.240   0.500  125  102    4.2   299  265   62 0.241   2021
  5   2.0  189.19   0.300   0.620  126  102    4.9   300  265   62 0.241   2261
  1   2.0  190.00   0.240   0.530  122  102    4.5   244  265    - 0.241   1946
  2   2.0  190.97   0.280   0.570  124  102    4.7   269  265    - 0.241   2139
  3   2.0  191.83   0.310   0.650  126  102    5.1   290  265   61 0.241   2283
  4   2.0  192.50   0.160   0.330  126  102    3.6   290  265   61 0.241   1640
  5   2.0  193.43   0.310   0.650  126  102    5.2   291  265   61 0.241   2285
  1   2.0  194.40   0.350   0.770  121  101    5.6   261  265    - 0.241   2379
  2   2.0  195.44   0.360   0.800  124  102    5.9   291  265    - 0.241   2462
  3   2.0  196.49   0.370   0.780  126  102    5.9   293  265   61 0.241   2500
  4   2.0  197.53   0.370   0.780  126  102    5.9   290  265   61 0.241   2495
  5   2.0  198.63   0.450   0.930  126  102    6.6   287  265   61 0.241   2746
  1   2.0  199.48   0.250   0.560  120  102    4.8   252  265    - 0.241   1998
  2   2.0  200.41   0.300   0.660  122  102    5.1   271  265    - 0.241   2218
  3   2.0  201.45   0.370   0.820  124  102    6.0   282  260   62 0.241   2481
  4   2.0  202.50   0.380   0.800  126  102    6.0   282  260   62 0.241   2515
  5   2.0  203.69   0.450   0.920  126  102    6.6   283  260   62 0.241   2738
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201

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TPUT DATE - 08/18/80                                          KENVIRONS, INC.
     TIME - 12:00:38                                          PROJECT NO. 80019
-------------------------------------------------------------------------------
     BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
-------------------------------------------------------------------------------

              PARTICULATE AND SO2 DATA WITH CALCULATED VALUES

                            RUN - STK008
                            DATE- 07/24/80

TMOS  ATMOS  STACK   H2O    PARTIC  STACK  INIT    PERC PERC PERC PITOT
MP    PRES   PRES    COND   WT-TTL  AREA   VOL     O2   CO2  CO   TUBE
G.F) (I.HG) (I.HG)  (ML)   (MG)    (IN2)  (DCF)   DRY  DRY  DRY  COEF

80    29.60  29.55  109.1    76.30  40828  707.52  7.7 10.8  0.0 0.840

   NBACL2     VT      VTB   VSOLN    VA
    (N)      (ML)    (ML)   (ML)    (ML)

0.01023000   8.75    0.01  1000.0  10.0


ORT- SAMP  METER   DELTA   DELTA TEMP TEMP TRAIN STACK BOX BATH PROBE  VEL
OINT TIME   VOL      P       H    IN   OUT  VAC   TEMP TEMP TEMP T DIA
    (MIN)  (DCF) (I.H2O) (I.H2O) (F)  (F) (I.HG)  (F)  (F)  (F)  (IN) (FPM)

  1   3.0  708.41  0.450  0.260   92   84    3.4  162  275   68 0.172  2494
  2   3.0  709.44  0.600  0.350  100   84    3.5  167  270   64 0.172  2892
  3   3.0  710.55  0.700  0.410  105   84    3.9  168  265   62 0.172  3126
  4   3.0  711.71  0.750  0.440  107   84    4.0  169  265   60 0.172  3238
  5   3.0  712.88  0.750  0.440  109   84    4.1  169  260   59 0.172  3238
  6   3.0  714.04  0.750  0.440  110   85    4.1  168  260   59 0.172  3236
  7   3.0  715.20  0.750  0.440  111   85    4.1  168  265   62 0.172  3236
  1   3.0  716.09  0.450  0.260  105   88    3.1  163  275   68 0.172  2496
  2   3.0  717.12  0.600  0.350  110   88    3.7  169  270   66 0.172  2896
  3   3.0  718.23  0.700  0.410  112   88    4.0  168  265   64 0.172  3126
  4   3.0  719.40  0.750  0.440  113   88    4.2  167  270   68 0.172  3233
  5   3.0  720.57  0.750  0.440  115   88    4.1  166  275   68 0.172  3231
  6   3.0  721.74  0.750  0.440  115   89    4.2  166  280   66 0.172  3231
  7   3.0  722.91  0.750  0.440  116   89    4.2  165  285   63 0.172  3228
  1   3.0  723.79  0.450  0.260  105   91    3.2  167  285   68 0.172  2504
  2   3.0  724.83  0.600  0.350  112   90    3.8  171  285   68 0.172  2901
  3   3.0  725.97  0.700  0.410  115   90    4.0  174  280   75 0.172  3141
  4   3.0  727.14  0.750  0.440  116   90    4.3  170  280   74 0.172  3241
  5   3.0  728.33  0.750  0.440  116   90    4.3  169  275   78 0.172  3238
  6   3.0  729.51  0.750  0.440  117   90    4.3  166  280   70 0.172  3231
  7   3.0  730.70  0.750  0.440  118   90    4.3  167  280   67 0.172  3233
  1   3.0  731.62  0.450  0.260  109   93    3.2  163  270   71 0.172  2496
  2   3.0  732.65  0.600  0.350  114   92    3.8  170  285   71 0.172  2899
  3   3.0  733.74  0.700  0.410  116   92    4.0  170  280   69 0.172  3131
  4   3.0  734.94  0.750  0.440  118   92    4.1  170  265   68 0.172  3241
  5   3.0  736.12  0.750  0.440  118   92    4.2  169  270   68 0.172  3238
  6   3.0  737.31  0.750  0.440  118   92    4.3  169  280   70 0.172  3238
  7   3.0  738.50  0.750  0.440  118   92    4.4  168  280   68 0.172  3236
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OUTPUT DATE - 08/27/80
      TIME - 14:34:47                                    KENVIRONS, INC.
                                                         PROJECT NO. 80019  30
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        BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
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                    PARTICULATE AND SO2 EMISSION DATA

    NAME    DESCRIPTION                   UNITS

            TITLE OF RUN                             ESPA08      ESPB08      STK008
            DATE OF RUN                            07/24/80    07/24/80    07/24/80
            TIME OF RUN                           1100-1310   1100-1302   1100-1244
    DN      PROBE TIP DIAMETER               IN       0.238       0.241       0.172
    TT      NET TIME OF RUN                 MIN       100.0       100.0        84.0
    NP      NUMBER OF SAMPLING POINTS                    50          50          28
    Y       DRY GAS METER CALIB. FACTOR              1.0245      1.0340      1.0130
    PB      BAROMETRIC PRES, LAB          IN.HG       29.82       29.82       29.82
    PBC     BAROMETRIC PRES, CONSOLE      IN.HG       29.77       29.77       29.60
    PM      AVG ORF PRES DROP            IN.H2O       0.607       0.563       0.397
    VM      VOL DRY GAS-METER COND          DCF       44.31       42.69       30.98
    TM      AVG GAS METER TEMP            DEG.F        93.5       107.9       100.3
    VMSTD   VOL DRY GAS-STD COND           DSCF       43.14       40.89       29.28
    VW      TOTAL H2O COLLECTED              ML       107.5        99.3       109.1
    VWV     VOL H2O VAPOR-STD COND          SCF        5.06        4.67        5.14
    PMOS    PERCENT MOISTURE BY VOLUME                 10.5        10.3        14.9
    MD      MOLE FRACTION DRY GAS                     0.895       0.897       0.851
    PCO2    PERCENT CO2 BY VOLUME, DRY                 11.2        11.5        10.8
    PO2     PERCENT O2 BY VOLUME, DRY                   7.3         7.2         7.7
    PCO     PERCENT CO BY VOLUME, DRY                   0.0         0.0         0.0
    PN2     PERCENT N2 BY VOLUME, DRY                  81.5        81.3        81.4
    MWD     MOLECULAR WT-DRY STK GAS                  30.08       30.13       30.04
    MW      MOLECULAR WT-STK GAS                      28.81       28.88       28.25
    CP      PITOT TUBE COEFFICIENT                    0.840       0.840       0.840
    DPS     AVG SQRT STK VEL HEAD        IN.H2O       0.549       0.512       0.821
    TS      AVG STACK TEMPERATURE         DEG.F       309.3       294.9       167.8
    PS      STACK PRESSURE, ABSOLUTE      IN.HG       28.72       28.65       29.55
    VS      AVG STACK GAS VELOCITY          FPM        2280        2110        3070
    AS      STACK AREA                      IN2       33618       33618       40828
    QS      STK FLOWRATE, DRY, STD        DSCFM      314000      296000      614000
    QA      ACTUAL STACK FLOWRATE          ACFM      532000      492000      869000
    PERI    PERCENT ISOKINETIC                        103.9       102.0        99.7
    MT      PARTICULATE WT-TOTAL             MG      808.50      805.60       76.30
    CAN     PART. LOAD-TTL, STD         GR/DSCF       0.289       0.304       0.040
    C       PART. LOAD-TTL, STD         LB/DSCF   .00004130   .00004340   .00000574
    CAT     PART. LOAD-TTL, STK          GR/ACF       0.170       0.183       0.028
    CAW     PART. EMIS-TOTAL              LB/HR    778.0000    770.0000    212.0000
    E       EMISSION RATE              LB/MMBTU      0.6250      0.6490      0.0893
    F       F FACTOR                DSCF/MMBTU         9820        9820        9820
    SCONC   SO2, CONC., STD             LB/DSCF    3.52E-04    3.47E-04    2.15E-05
    SCONCA  SO2, CONC., STK              LB/ACF    2.08E-04    2.09E-04    1.52E-05
    SCHR    SO2 EMISSION RATE             LB/HR    6629.854    6158.371     794.000
    SCHM    SO2 EMISSION RATE          LB/MMBTU       5.330       5.190       0.335
    SCPPM   SO2, CONC., STD                 PPM        2120        2100         130
    SCPPMA  SO2, CONC., STK                 PPM        1900        1880         111
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UTPUT DATE - 08/18/80                                        KENVIRONS, INC.
      TIME - 12:02:10                                        PROJECT NO. 80019
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         BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
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              PARTICULATE AND SO2 DATA WITH CALCULATED VALUES

                              RUN - ESPA09
                              DATE- 07/23/80

TMOS  ATMOS  STACK    H2O    PARTIC  STACK  INIT     PERC PERC PERC PITOT
TEMP  PRES   PRES     COND   WT-TTL  AREA   VOL      O2   CO2  CO   TUBE
DG.F) (I.HG) (I.HG)   (ML)   (MG)    (IN2)  (DCF)    DRY  DRY  DRY  COEF

 76   29.79  28.74    95.9   907.40  33618  529.65   8.5 11.1  0.0 0.840

    NBACL2      VT       VTB    VSOLN     VA
     (N)       (ML)     (ML)    (ML)     (ML)

 0.01023000    24.36     0.02   1000.0    1.0


PORT- SAMP  METER   DELTA   DELTA TEMP TEMP TRAIN STACK BOX BATH PROBE  VEL
POINT TIME   VOL      P       H    IN  OUT   VAC  TEMP TEMP TEMP T DIA
      (MIN) (DCF) (I.H2O) (I.H2O) (F)  (F) (I.HG)  (F)  (F)  (F)  (IN) (FPM)

AA 1   2.0  530.55  0.290  0.560   85   84   4.2   283  235    - 0.238  2192
AA 2   2.0  531.52  0.380  0.730   89   85   5.0   305  240    - 0.238  2547
AA 3   2.0  532.47  0.340  0.650   91   86   4.8   324  240   58 0.238  2438
AA 4   2.0  533.45  0.370  0.710   92   86   5.0   330  245   58 0.238  2554
AA 5   2.0  534.49  0.430  0.820   94   87   5.3   330  245   58 0.238  2753
AB 1   2.0  535.35  0.290  0.560   92   87   4.1   272  255    - 0.238  2176
AB 2   2.0  536.37  0.420  0.800   95   88   5.2   300  255    - 0.238  2668
AB 3   2.0  537.40  0.410  0.780   97   88   5.2   326  255   58 0.238  2681
AB 4   2.0  538.39  0.370  0.710   98   89   5.0   332  255   58 0.238  2557
AB 5   2.0  539.45  0.450  0.860   99   89   5.8   331  260   56 0.238  2818
AC 1   2.0  540.24  0.240  0.460   97   90   3.8   286  265    - 0.238  1998
AC 2   2.0  541.14  0.330  0.630   99   90   4.7   312  265    - 0.238  2384
AC 3   2.0  542.07  0.330  0.630  100   91   4.7   323  265   58 0.238  2401
AC 4   2.0  542.97  0.300  0.580  101   91   4.4   329  260   57 0.238  2298
AC 5   2.0  543.88  0.320  0.610  102   92   4.5   334  265   56 0.238  2381
AD 1   2.0  544.56  0.180  0.340   98   92   3.1   297  265    - 0.238  1743
AD 2   2.0  545.31  0.220  0.420  100   93   3.7   311  255    - 0.238  1945
AD 3   2.0  546.12  0.250  0.480  101   93   3.9   331  250   60 0.238  2100
AD 4   2.0  546.90  0.230  0.440  102   94   3.8   328  255   58 0.238  2011
AD 5   2.0  547.75  0.280  0.540  103   94   4.1   320  260   55 0.238  2207
AE 1   2.0  548.18  0.070  0.130   97   95   2.0   243  250    - 0.238  1048
AE 2   2.0  548.50  0.040  0.080   96   95   0.0   305  250    - 0.238   826
AE 3   2.0  548.96  0.090  0.170   98   95   2.2   318  235   60 0.238  1250
AE 4   2.0  549.63  0.180  0.340  101   95   3.2   321  245   60 0.238  1771
AE 5   2.0  550.36  0.200  0.380  103   95   3.4   323  255   57 0.238  1869
AF 1   2.0  551.02  0.170  0.320  100   95   3.1   212  250    - 0.238  1596
AF 2   2.0  551.59  0.110  0.210  101   96   2.7   306  250    - 0.238  1371
AF 3   2.0  552.06  0.080  0.150  100   96   2.2   309  245   62 0.238  1171
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OUTPUT DATE - 08/18/80
       TIME - 12:02:11                                          KENVIRONS, INC.
-------------------------------------------------------------- PROJECT NO. 80019
-------------------------------------------------------------------------------
        BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
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PORT- SAMP  METER    DELTA    DELTA  TEMP TEMP TRAIN STACK BOX  BATH PROBE   VEL
POINT TIME   VOL       P        H     IN   OUT  VAC  TEMP  TEMP TEMP T DIA
      (MIN) (DCF) (I.H2O) (I.H2O)   (F)  (F) (I.HG)  (F)   (F)  (F)  (IN)  (FPM)

AF 4   2.0  552.77  0.210   0.400   104   97   3.7   312   245   58 0.238  1902
AF 5   2.0  553.53  0.220   0.420   105   97   3.8   314   250   54 0.238  1949
AG 1   2.0  554.19  0.170   0.320   102   97   3.1   250   255    - 0.238  1641
AG 2   2.0  555.01  0.260   0.500   106   98   4.0   299   255    - 0.238  2098
AG 3   2.0  555.86  0.270   0.520   107   98   4.1   308   255   56 0.238  2151
AG 4   2.0  556.70  0.270   0.520   108   99   4.1   305   255   54 0.238  2147
AG 5   2.0  557.62  0.330   0.630   109   99   4.8   300   255   54 0.238  2365
AH 1   2.0  558.51  0.300   0.580   107   99   4.4   281   260    - 0.238  2227
AH 2   2.0  559.41  0.300   0.580   108  100   4.4   288   260    - 0.238  2237
AH 3   2.0  560.35  0.340   0.650   110  100   4.9   296   260   56 0.238  2395
AH 4   2.0  561.23  0.280   0.540   110  101   4.2   297   260   57 0.238  2174
AH 5   2.0  562.18  0.360   0.690   111  101   5.0   298   260   56 0.238  2467
AI 1   2.0  563.21  0.420   0.800   108  101   5.3   271   260    - 0.238  2617
AI 2   2.0  564.25  0.420   0.800   111  101   5.5   287   260    - 0.238  2645
AI 3   2.0  565.31  0.430   0.820   111  102   5.7   291   255   56 0.238  2684
AI 4   2.0  566.36  0.430   0.820   112  102   5.8   291   250   56 0.238  2684
AI 5   2.0  567.49  0.500   0.960   113  103   6.3   289   250   56 0.238  2890
AJ 1   2.0  568.60  0.480   0.920   108  101   6.1   265   260    - 0.238  2786
AJ 2   2.0  569.73  0.500   0.960   111  102   6.3   284   260    - 0.238  2881
AJ 3   2.0  570.85  0.480   0.920   112  103   6.1   284   250   58 0.238  2822
AJ 4   2.0  571.96  0.480   0.920   113  103   6.1   285   250   56 0.238  2824
AJ 5   2.0  573.18  0.600   1.150   114  104   7.6   284   255   56 0.238  3156
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OUTPUT DATE - 08/18/80                                      KENVIRONS, INC.
       TIME - 12:02:12                                      PROJECT NO. 80019
-------------------------------------------------------------------------------
         BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
-------------------------------------------------------------------------------

              PARTICULATE AND SO2 DATA WITH CALCULATED VALUES

                               RUN - ESPB09
                               DATE- 07/25/80

ATMOS  ATMOS  STACK   H2O    PARTIC  STACK   INIT    PERC PERC PERC PITOT
TEMP   PRES   PRES    COND   WT-TTL  AREA    VOL     O2   CO2  CO   TUBE
(DG.F) (I.HG) (I.HG)  (ML)   (MG)    (IN2)   (DCF)   DRY  DRY  DRY  COEF

 95    29.79  28.74   87.2   1242.00 33618   210.55  9.3  9.3  0.0  0.840

    NBACL2       VT       VTB    VSOLN     VA
     (N)        (ML)      (ML)    (ML)    (ML)

 0.01023000     22.59     0.02   1000.0    1.0


PORT- SAMP  METER   DELTA    DELTA  TEMP TEMP TRAIN STACK BOX  BATH PROBE   VEL
POINT TIME  VOL       P        H     IN  OUT   VAC  TEMP  TEMP TEMP T DIA
      (MIN) (DCF) (I.H2O) (I.H2O)  (F)  (F) (I.HG)  (F)  (F)   (F)  (IN) (FPM)

BA 1   2.0  211.54  0.300   0.680    97   94   4.9   244   275    - 0.241  2178
BA 2   2.0  212.53  0.320   0.730   104   94   4.8   311   275    - 0.241  2354
BA 3   2.0  213.50  0.340   0.710   108   94   4.8   330   260   65 0.241  2456
BA 4   2.0  214.45  0.330   0.670   110   95   4.4   339   260   65 0.241  2433
BA 5   2.0  215.41  0.380   0.760   112   95   4.9   338   260   65 0.241  2610
BB 1   2.0  216.42  0.330   0.740   110   95   4.8   273   260    - 0.241  2331
BB 2   2.0  217.32  0.310   0.650   114   96   4.4   294   260    - 0.241  2291
BB 3   2.0  218.32  0.350   0.710   118   97   4.8   331   250   62 0.241  2493
BB 4   2.0  219.27  0.320   0.650   120   97   4.4   338   250   62 0.241  2395
BB 5   2.0  220.22  0.380   0.760   121   98   4.8   335   250   62 0.241  2605
BC 1   2.0  221.08  0.240   0.540   118  100   4.1   258   250    - 0.241  1967
BC 2   2.0  222.04  0.330   0.720   120  100   4.9   285   250    - 0.241  2350
BC 3   2.0  223.03  0.330   0.720   122  100   4.9   319   245   67 0.241  2403
BC 4   2.0  223.94  0.280   0.560   124  100   4.2   331   245   66 0.241  2230
BC 5   2.0  224.80  0.290   0.580   125  101   4.3   337   245   66 0.241  2278
BD 1   2.0  225.48  0.160   0.340   120  102   3.2   262   245    - 0.241  1611
BD 2   2.0  226.20  0.180   0.380   124  102   3.5   301   245    - 0.241  1754
BD 3   2.0  226.95  0.200   0.420   125  103   3.5   318   240   66 0.241  1869
BD 4   2.0  227.69  0.200   0.410   126  103   3.5   327   245   66 0.241  1880
BD 5   2.0  228.46  0.220   0.460   128  104   3.7   324   245   66 0.241  1968
BE 1   2.0  228.75  0.030   0.080   121  104   1.9   218   250    - 0.241   676
BE 2   2.0  229.20  0.090   0.200   124  104   2.5   253   250    - 0.241  1200
BE 3   2.0  229.72  0.100   0.210   126  105   2.5   300   250   70 0.241  1306
BE 4   2.0  230.35  0.140   0.300   127  105   2.1   315   250   68 0.241  1561
BE 5   2.0  231.03  0.170   0.360   128  106   2.5   318   255   65 0.241  1723
BF 1   2.0  231.59  0.070   0.160   122  106   2.4   260   255    - 0.241  1064
BF 2   2.0  232.04  0.120   0.250   126  106   2.9   294   255    - 0.241  1425
BF 3   2.0  232.68  0.120   0.250   127  106   2.9   306   250   63 0.241  1437
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TPUT DATE - 08/18/80                          KENVIRONS, INC.
     TIME - 12:02:12                          PROJECT NO. 80019
----------------------------------------------------------------------
      BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
----------------------------------------------------------------------

RT- SAMP  METER   DELTA   DELTA TEMP TEMP TRAIN STACK BOX BATH PROBE   VEL
INT TIME   VOL      P       H    IN   OUT  VAC  TEMP TEMP TEMP T DIA
   (MIN)  (DCF) (I.H2O) (I.H2O) (F)  (F) (I.HG)  (F)  (F)  (F)  (IN) (FPM)

  4  2.0  233.29  0.160  0.330  128  106   3.1   311  250   63 0.241  1664
  5  2.0  234.01  0.180  0.380  129  106   3.3   309  250   63 0.241  1763
G 1  2.0  234.61  0.150  0.340  124  107   2.9   222  250    - 0.241  1516
  2  2.0  235.36  0.170  0.380  126  107   3.5   283  250    - 0.241  1684
  3  2.0  236.05  0.200  0.430  129  107   3.8   297  250   64 0.241  1844
G 4  2.0  236.82  0.200  0.430  129  107   3.8   303  250   64 0.241  1851
G 5  2.0  237.68  0.250  0.530  130  107   4.2   302  250   64 0.241  2068
  1  2.0  238.48  0.210  0.480  125  108   3.8   260  250    - 0.241  1843
  2  2.0  239.36  0.260  0.550  129  108   4.1   289  250    - 0.241  2091
H 3  2.0  240.23  0.270  0.580  130  108   4.2   297  250   60 0.241  2142
  4  2.0  240.91  0.120  0.250  130  108   3.0   298  250   60 0.241  1429
  5  2.0  241.82  0.290  0.700  130  108   4.8   296  250   60 0.241  2219
I 1  2.0  242.77  0.320  0.700  126  108   4.8   258  250    - 0.241  2271
  2  2.0  243.80  0.350  0.740  126  108   5.0   282  250    - 0.241  2415
  3  2.0  244.86  0.370  0.780  126  109   5.1   287  250   60 0.241  2491
I 4  2.0  245.80  0.440  0.920  128  109   5.9   286  250   60 0.241  2715
I 5  2.0  246.98  0.440  0.920  129  109   5.9   284  250   60 0.241  2711
  1  2.0  247.83  0.230  0.550  124  110   4.3   275  250    - 0.241  1948
J 2  2.0  248.73  0.270  0.570  129  110   4.3   288  245   62 0.241  2130
J 3  2.0  249.69  0.360  0.750  131  110   5.2   288  245   62 0.241  2459
  4  2.0  250.76  0.380  0.800  132  110   5.3   284  245   62 0.241  2520
  5  2.0  252.90  0.470  0.990  134  110   6.3   282  245   62 0.241  2798
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OUTPUT DATE - 08/18/80                                          KENVIRONS, INC.
       TIME - 12:02:12                                          PROJECT NO. 80019
----------------------------------------------------------------------------------
           BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
----------------------------------------------------------------------------------

                    PARTICULATE AND SO2 DATA WITH CALCULATED VALUES

                                  RUN - STK009
                                  DATE- 07/25/80

ATMOS  ATMOS  STACK   H2O    PARTIC  STACK  INIT    PERC PERC PERC PITOT
TEMP   PRES   PRES    COND   WT-TTL  AREA   VOL     O2   CO2  CO   TUBE
(DG.F) (I.HG) (I.HG)  (ML)   (MG)    (IN2)  (DCF)   DRY  DRY  DRY  COEF

  82   29.62  29.57  110.0    98.40  40828  744.33  7.9 10.7  0.0 0.840


     NBACL2        VT        VTB    VSOLN       VA
      (N)         (ML)       (ML)    (ML)      (ML)

 0.01023000       9.51      0.02   1000.0    10.0


 PORT- SAMP  METER   DELTA    DELTA  TEMP TEMP TRAIN STACK BOX BATH PROBE  VEL
 POINT TIME   VOL      P        H     IN  OUT   VAC  TEMP TEMP TEMP T DIA
       (MIN) (DCF) (I.H2O) (I.H2O)  (F)  (F) (I.HG)  (F)  (F)  (F)  (IN) (FPM)

 A  1   3.0  745.30  0.500   0.290   90   85    3.4   173  250   64 0.172  2649
 A  2   3.0  746.35  0.600   0.350   98   85    3.6   177  245   63 0.172  2911
 A  3   3.0  747.52  0.750   0.440  104   86    4.0   173  230   61 0.172  3244
 A  4   3.0  748.71  0.750   0.440  108   87    4.0   172  240   59 0.172  3242
 A  5   3.0  749.92  0.800   0.470  110   88    4.2   171  245   59 0.172  3345
 A  6   3.0  751.15  0.800   0.470  112   88    4.2   176  255   59 0.172  3358
 A  7   3.0  752.37  0.800   0.470  114   89    4.3   178  250   59 0.172  3364
 D  1   3.0  753.34  0.500   0.290  106   92    3.3   175  250   67 0.172  2653
 D  2   3.0  754.43  0.650   0.380  114   92    3.8   179  245   66 0.172  3034
 D  3   3.0  755.62  0.750   0.440  116   92    4.1   176  250   65 0.172  3252
 D  4   3.0  756.84  0.800   0.470  118   92    4.2   171  245   63 0.172  3345
 D  5   3.0  758.08  0.800   0.470  119   93    4.3   177  240   66 0.172  3361
 D  6   3.0  759.30  0.800   0.470  120   94    4.3   172  250   62 0.172  3348
 D  7   3.0  760.54  0.800   0.470  121   94    4.3   171  250   64 0.172  3345
 C  1   3.0  761.50  0.500   0.290  110   96    3.4   174  250   68 0.172  2651
 C  2   3.0  762.56  0.600   0.350  118   96    3.7   178  240   68 0.172  2913
 C  3   3.0  763.78  0.800   0.470  120   96    4.3   181  250   67 0.172  3372
 C  4   3.0  765.05  0.850   0.500  122   96    4.6   179  245   65 0.172  3470
 C  5   3.0  766.32  0.850   0.500  122   96    4.6   178  240   65 0.172  3467
 C  6   3.0  767.60  0.850   0.500  123   96    4.6   178  240   64 0.172  3467
 C  7   3.0  768.87  0.850   0.500  124   96    4.7   176  240   62 0.172  3462
 B  1   3.0  769.85  0.500   0.290  115   98    3.4   170  245   67 0.172  2642
 B  2   3.0  771.00  0.700   0.410  121   98    4.0   172  245   66 0.172  3132
 B  3   3.0  772.25  0.850   0.500  123   98    4.5   176  255   66 0.172  3462
 B  4   3.0  773.54  0.850   0.500  124   98    4.8   169  235   62 0.172  3443
 B  5   3.0  774.89  0.850   0.500  124   98    4.8   170  240   64 0.172  3445
 B  6   3.0  776.07  0.850   0.500  125   98    4.9   172  245   65 0.172  3451
 B  7   3.0  777.34  0.850   0.500  125   98    4.9   177  250   67 0.172  3464
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OUTPUT DATE - 08/27/80
       TIME - 14:35:21                                        KENVIRONS, INC.
                                                              PROJECT NO. 80019
-------------------------------------------------------------------------------
       BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
-------------------------------------------------------------------------------

                    PARTICULATE AND SO2 EMISSION DATA

      NAME   DESCRIPTION                 UNITS

             TITLE OF RUN                            ESPA09     ESPB09     STK009
             DATE OF RUN                           07/25/80   07/25/80   07/25/80
             TIME OF RUN                          1145-1344  1145-1350  1145-1321
      DN     PROBE TIP DIAMETER             IN        0.238      0.241      0.172
      TT     NET TIME OF RUN               MIN        100.0      100.0       84.0
      NP     NUMBER OF SAMPLING POINTS                   50         50         28
      Y      DRY GAS METER CALIB. FACTOR             1.0240     1.0338     1.0135
      PB     BAROMETRIC PRES, LAB        IN.HG        29.84      29.84      29.84
      PBC    BAROMETRIC PRES, CONSOLE    IN.HG        29.79      29.79      29.62
      PM     AVG ORF PRES DROP          IN.H20        0.590      0.542      0.437
      VM     VOL DRY GAS-METER COND        DCF        43.53      42.35      33.01
      TM     AVG GAS METER TEMP          DEG.F         98.9      113.6      104.7
      VMSTD  VOL DRY GAS-STD COND         DSCF        41.99      40.17      31.00
      VW     TOTAL H2O COLLECTED            ML         95.9       87.2      110.0
      VWV    VOL H2O VAPOR-STD COND        SCF         4.51       4.10       5.18
      PMOS   PERCENT MOISTURE BY VOLUME                 9.7        9.3       14.3
      MD     MOLE FRACTION DRY GAS                    0.903      0.907      0.857
      PCO2   PERCENT CO2 BY VOLUME, DRY                11.1        9.3       10.7
      PO2    PERCENT O2 BY VOLUME, DRY                  8.5        9.3        7.9
      PCO    PERCENT CO BY VOLUME, DRY                  0.0        0.0        0.0
      PN2    PERCENT N2 BY VOLUME, DRY                 80.4       81.5       81.4
      MWD    MOLECULAR WT-DRY STK GAS                 30.12      29.85      30.03
      MW     MOLECULAR WT-STK GAS                     28.95      28.75      28.31
      CP     PITOT TUBE COEFFICIENT                   0.840      0.840      0.840
      DPS    AVG SQRT STK VEL HEAD      IN.H2O        0.541      0.492      0.860
      TS     AVG STACK TEMPERATURE       DEG.F        300.4      294.8      174.7
      PS     STACK PRESSURE, ABSOLUTE    IN.HG        28.74      28.74      29.57
      VS     AVG STACK GAS VELOCITY        FPM         2230       2030       3220
      AS     STACK AREA                    IN2        33618      33618      40828
      QS     STK FLOWRATE, DRY, STD      DSCFM       313000     288000     644000
      QA     ACTUAL STACK FLOWRATE        ACFM       521000     473000     914000
      PERI   PERCENT ISOKINETIC                       101.2      102.7      100.7
      MT     PARTICULATE WT-TOTAL           MG       907.40    1242.00      98.40
      CAN    PART. LOAD-TTL, STD       GR/DSCF        0.334      0.477      0.049
      C      PART. LOAD-TTL, STD       LB/DSCF    .00004760  .00006820  .00000699
      CAT    PART. LOAD-TTL, STK        GR/ACF        0.201      0.291      0.035
      CAW    PART. EMIS-TOTAL            LB/HR     896.0000  1178.8716   270.0000
      E      EMISSION RATE            LB/MMBTU       0.7890     1.2000     0.1100
      F      F FACTOR               DSCF/MMBTU         9820       9820       9820
      SCONC  SO2, CONC., STD           LB/DSCF    4.19E-04   4.06E-04   2.21E-05
      SCONCA SO2, CONC., STK            LB/ACF    2.52E-04   2.47E-04   1.56E-05
      SCHR   SO2 EMISSION RATE           LB/HR    7876.590   7019.656    854.000
      SCMM   SO2 EMISSION RATE        LB/MMBTU       6.930      7.150      0.349
      SCPPM  SO2, CONC., STD               PPM        2530       2450        133
      SCPPMA SO2, CONC., STK               PPM        2280       2220        114
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OUTPUT DATE - 08/18/80                                          KENVIRONS, INC.
       TIME - 12:02:44                                          PROJECT NO. 80019
------------------------------------------------------------------------------------
         BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
------------------------------------------------------------------------------------

                 PARTICULATE AND SO2 DATA WITH CALCULATED VALUES

                               RUN - ESPA10
                               DATE- 07/26/80

ATMOS  ATHOS  STACK   H2O   PARTIC  STACK   INIT    PERC PERC PERC PITOT
TEMP   PRES   PRES    COND  WT-TTL  AREA    VOL     O2   CO2  CO   TUBE
(DG.F) (I.HG) (I.HG)  (ML)  (MG)    (IN2)   (DCF)   DRY  DRY  DRY  COEF

 85    29.73  28.57   92.9  1216.70 33618   580.41  7.0  11.5 0.0  0.840

     NBACL2        VT        VTB    VSOLN     VA
      (N)         (ML)       (ML)    (ML)    (ML)

  0.01023000      22.83      0.04   1000.0    1.0


PORT- SAMP  METER   DELTA   DELTA  TEMP TEMP TRAIN STACK BOX  BATH PROBE  VEL
POINT TIME  VOL       P       H     IN   OUT  VAC  TEMP  TEMP TEMP T DIA
      (MIN) (DCF) (I.H2O) (I.H2O)  (F)  (F) (I.HG)  (F)  (F)  (F)  (IN) (FPM)

AJ 1   2.0  581.43  0.370  0.760    82   78   5.1   259   270    - 0.238  2443
AJ 2   2.0  582.54  0.430  0.890    85   78   5.5   268   260    - 0.238  2650
AJ 3   2.0  583.58  0.410  0.780    88   79   5.0   270   250   64 0.238  2591
AJ 4   2.0  584.66  0.420  0.850    90   80   5.3   266   270   64 0.238  2615
AJ 5   2.0  585.82  0.510  1.030    93   81   6.2   267   285   62 0.238  2884
AI 1   2.0  586.85  0.390  0.790    92   84   4.9   272   245    - 0.238  2530
AI 2   2.0  587.91  0.410  0.840    95   85   5.1   277   245    - 0.238  2603
AI 3   2.0  588.98  0.430  0.820    97   86   5.1   285   245   60 0.238  2681
AI 4   2.0  590.03  0.420  0.800    98   87   5.0   281   245   62 0.238  2642
AI 5   2.0  591.15  0.500  0.960   100   87   5.9   279   250   60 0.238  2879
AH 1   2.0  592.00  0.270  0.520    96   89   3.8   272   255    - 0.238  2105
AH 2   2.0  592.99  0.290  0.590    99   89   4.1   280   255    - 0.238  2194
AH 3   2.0  593.81  0.320  0.610   100   90   4.2   288   250   60 0.238  2317
AH 4   2.0  594.68  0.270  0.520   101   90   3.9   288   250   60 0.238  2128
AH 5   2.0  595.63  0.350  0.670   102   91   4.5   286   255   58 0.238  2420
AG 1   2.0  596.29  0.160  0.310    99   92   3.0   282   260    - 0.238  1632
AG 2   2.0  597.09  0.240  0.460   101   92   3.6   294   260    - 0.238  2015
AG 3   2.0  597.94  0.270  0.520   103   93   4.0   299   260   62 0.238  2144
AG 4   2.0  598.80  0.270  0.520   104   93   4.0   291   260   62 0.238  2133
AG 5   2.0  599.72  0.320  0.610   105   94   4.2   288   260   60 0.238  2317
AF 1   2.0  600.29  0.120  0.230   100   94   2.5   288   265    - 0.238  1419
AF 2   2.0  600.84  0.110  0.210   101   95   2.5   296   265    - 0.238  1366
AF 3   2.0  601.29  0.070  0.130   100   95   2.0   303   260   62 0.238  1095
AF 4   2.0  602.01  0.200  0.380   104   96   3.2   302   260   62 0.238  1849
AF 5   2.0  602.77  0.210  0.400   106   96   3.3   306   260   62 0.238  1900
AE 1   2.0  603.05  0.030  0.060    99   98   0.0   253   260    - 0.238   693
AE 2   2.0  603.23  0.020  0.040   100   99   0.0   300   260    - 0.238   584
AE 3   2.0  603.60  0.060  0.110   101   99   0.0   319   255   74 0.238  1024
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OUTPUT DATE - 08/18/80                                KENVIRONS, INC.
       TIME - 12:02:45                                PROJECT NO. 80019
--------------------------------------------------------------------------
       BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
--------------------------------------------------------------------------


PORT- SAMP  METER    DELTA    DELTA  TEMP TEMP TRAIN STACK BOX  BATH PROBE  VEL
POINT TIME   VOL       P        H     IN   OUT  VAC  TEMP TEMP  TEMP T DIA
      (MIN) (DCF) (I.H2O) (I.H2O)  (F)  (F) (I.HG)  (F)  (F)   (F)  (IN) (FPM)

AE 4   2.0  604.22  0.150   0.290   105   99   2.9  323  255    72 0.238  1623
AE 5   2.0  604.91  0.170   0.330   107  100   3.0  323  255    68 0.238  1728
AD 1   2.0  605.60  0.170   0.330   106  100   3.0  311  260     - 0.238  1715
AD 2   2.0  606.36  0.210   0.400   108  100   3.3  320  260     - 0.238  1917
AD 3   2.0  607.15  0.230   0.440   110  101   3.6  330  260    66 0.238  2019
AD 4   2.0  607.95  0.230   0.440   110  101   3.7  325  260    68 0.238  2012
AD 5   2.0  608.81  0.270   0.520   112  101   4.0  312  260    68 0.238  2162
AC 1   2.0  609.67  0.270   0.520   108  102   4.0  298  270     - 0.238  2143
AC 2   2.0  610.58  0.300   0.580   111  102   4.2  312  265     - 0.238  2279
AC 3   2.0  611.51  0.310   0.600   112  102   4.3  326  265    66 0.238  2338
AC 4   2.0  612.40  0.290   0.520   112  103   4.1  331  270    66 0.238  2268
AC 5   2.0  613.31  0.330   0.590   113  102   4.3  336  270    64 0.238  2427
AB 1   2.0  614.20  0.290   0.560   110  102   4.2  290  270     - 0.238  2209
AB 2   2.0  615.25  0.430   0.820   113  102   5.4  304  270     - 0.238  2715
AB 3   2.0  616.31  0.410   0.790   113  103   5.3  332  270    64 0.238  2699
AB 4   2.0  617.29  0.360   0.650   114  103   4.8  339  265    62 0.238  2540
AB 5   2.0  618.32  0.430   0.790   115  103   5.4  329  265    62 0.238  2759
AA 1   2.0  619.18  0.270   0.520   110  103   4.0  295  265     - 0.238  2138
AA 2   2.0  620.20  0.400   0.770   113  104   5.3  316  265     - 0.238  2639
AA 3   2.0  621.21  0.360   0.700   114  104   5.2  335  270    64 0.238  2534
AA 4   2.0  622.19  0.370   0.670   114  104   5.0  337  265    62 0.238  2572
AA 5   2.0  623.25  0.430   0.820   115  104   5.9  339  265    62 0.238  2776
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OUTPUT DATE - 08/18/80                                        KENVIRONS, INC.
       TIME - 12:02:46                                        PROJECT NO. 80019
-------------------------------------------------------------------------------
        BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
-------------------------------------------------------------------------------

                PARTICULATE AND SO2 DATA WITH CALCULATED VALUES

                               RUN - ESPB10
                               DATE- 07/26/80

ATMOS  ATMOS  STACK   H2O    PARTIC  STACK   INIT    PERC PERC PERC PITOT
TEMP   PRES   PRES    COND   WT-TTL  AREA    VOL     O2   CO2  CO   TUBE
(DG.F) (I.HG) (I.HG)  (ML)   (MG)    (IN2)   (DCF)   DRY  DRY  DRY  COEF

  85   29.73  28.64   86.5   710.20  33618   260.10  7.3  12.8  0.0 0.840

     NBACL2       VT        VTB    VSOLN      VA
      (N)        (ML)       (ML)    (ML)     (ML)

  0.01023000     21.56      0.04   1000.0     1.0


PORT- SAMP  METER   DELTA   DELTA  TEMP TEMP TRAIN STACK BOX BATH PROBE  VEL
POINT TIME   VOL      P       H     IN   OUT  VAC  TEMP TEMP TEMP T DIA
      (MIN) (DCF) (I.H2O) (I.H2O)  (F)  (F) (I.HG)  (F)  (F)  (F)  (IN) (FPM)

BA 1   2.0  261.10  0.310  0.700    88   84   5.0   264  270   - 0.241  2232
BA 2   2.0  262.05  0.330  0.700    94   84   4.9   306  270   - 0.241  2369
BA 3   2.0  263.02  0.340  0.720    98   84   4.9   325  275  63 0.241  2434
BA 4   2.0  263.97  0.330  0.680   101   84   4.8   331  275  63 0.241  2407
BA 5   2.0  265.00  0.380  0.790   105   85   5.2   329  275  63 0.241  2580
BB 1   2.0  265.93  0.320  0.710   103   86   4.8   259  270   - 0.241  2260
BB 2   2.0  266.87  0.320  0.670   107   87   4.8   304  270   - 0.241  2330
BB 3   2.0  267.85  0.350  0.740   109   88   4.9   323  270  64 0.241  2467
BB 4   2.0  268.78  0.310  0.640   111   88   4.5   330  270  64 0.241  2332
BB 5   2.0  269.75  0.360  0.740   113   90   5.0   327  270  64 0.241  2508
BC 1   2.0  270.60  0.230  0.530   110   90   4.0   252  270   - 0.241  1907
BC 2   2.0  271.40  0.300  0.640   113   91   4.5   285  270   - 0.241  2228
BC 3   2.0  272.38  0.300  0.640   114   91   4.6   314  270  63 0.241  2271
BC 4   2.0  273.24  0.270  0.550   116   92   4.0   326  270  63 0.241  2171
BC 5   2.0  274.12  0.300  0.610   117   92   4.5   327  270  63 0.241  2290
BD 1   2.0  274.78  0.140  0.320   113   93   3.0   245  270   - 0.241  1480
BD 2   2.0  275.46  0.170  0.360   116   94   3.2   284  270   - 0.241  1676
BD 3   2.0  276.20  0.200  0.430   117   94   3.7   311  270  63 0.241  1850
BD 4   2.0  276.94  0.200  0.430   118   94   3.7   317  270  63 0.241  1857
BD 5   2.0  277.73  0.230  0.490   120   94   4.0   312  270  63 0.241  1985
BE 1   2.0  278.15  0.070  0.160   114   96   2.1   222  270   - 0.241  1029
BE 2   2.0  278.74  0.130  0.290   118   97   3.0   264  270   - 0.241  1446
BE 3   2.0  279.30  0.120  0.250   119   97   2.7   292  265  66 0.241  1415
BE 4   2.0  279.96  0.160  0.340   120   98   3.1   307  265  66 0.241  1651
BE 5   2.0  280.66  0.180  0.400   122   98   3.5   309  265  66 0.241  1753
BF 1   2.0  281.16  0.080  0.180   119   99   2.3   274  265   - 0.241  1142
BF 2   2.0  281.65  0.110  0.230   120   99   2.6   293  265   - 0.241  1356
BF 3   2.0  282.20  0.130  0.270   122   99   2.8   302  265  66 0.241  1483
```

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OUTPUT DATE - 08/18/80
       TIME - 12:02:46                                   KENVIRONS, INC.
                                                         PROJECT NO. 80019
-------------------------------------------------------------------------------
      BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
-------------------------------------------------------------------------------

PORT-  SAMP  METER    DELTA    DELTA  TEMP TEMP  TRAIN STACK  BOX  BATH PROBE    VEL
POINT  TIME   VOL       P        H     IN   OUT   VAC  TEMP  TEMP  TEMP T DIA
      (MIN)  (DCF)  (I.H2O)  (I.H2O)  (F)  (F)  (I.HG)  (F)   (F)   (F)  (IN)  (FPM)

BF 4   2.0  282.87  0.160    0.340   123  100    3.1   304   265    66 0.241   1647
BF 5   2.0  283.54  0.170    0.360   124  100    3.3   302   265    64 0.241   1696
BG 1   2.0  284.30  0.200    0.420   120  101    3.7   256   265     - 0.241   1783
BG 2   2.0  285.01  0.190    0.400   124  102    3.5   287   265     - 0.241   1775
BG 3   2.0  285.85  0.230    0.480   126  102    3.9   297   260    62 0.241   1966
BG 4   2.0  286.64  0.230    0.480   127  102    4.0   297   260    62 0.241   1966
BG 5   2.0  287.52  0.280    0.600   128  102    4.5   294   260    62 0.241   2165
BH 1   2.0  288.35  0.240    0.540   124  103    4.1   262   260     - 0.241   1961
BH 2   2.0  289.22  0.260    0.550   128  104    4.2   281   260     - 0.241   2068
BH 3   2.0  290.12  0.270    0.570   129  105    4.4   292   260    64 0.241   2123
BH 4   2.0  290.70  0.130    0.260   129  105    2.9   292   260    64 0.241   1473
BH 5   2.0  291.58  0.290    0.620   130  105    4.5   291   260    64 0.241   2199
BI 1   2.0  292.55  0.290    0.650   126  106    4.6   261   260     - 0.241   2155
BI 2   2.0  293.59  0.340    0.720   130  106    5.0   281   260     - 0.241   2365
BI 3   2.0  294.51  0.360    0.760   132  106    5.1   286   260    65 0.241   2442
BI 4   2.0  295.57  0.360    0.760   132  107    5.1   283   260    65 0.241   2437
BI 5   2.0  296.64  0.440    0.930   133  107    6.3   282   260    65 0.241   2692
BJ 1   2.0  297.60  0.300    0.660   126  108    4.9   279   260     - 0.241   2219
BJ 2   2.0  298.53  0.300    0.660   129  108    4.9   282   260     - 0.241   2223
BJ 3   2.0  299.56  0.380    0.800   131  108    5.3   286   260    66 0.241   2509
BJ 4   2.0  300.59  0.380    0.800   133  108    5.6   284   260    66 0.241   2505
BJ 5   2.0  301.63  0.450    0.950   134  108    5.9   282   260    66 0.241   2723
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-JTPUT DATE - 08/18/80                                        KENVIRONS, INC.
       TIME - 12:02:47                                        PROJECT NO. 80019
-------------------------------------------------------------------------------
          BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
-------------------------------------------------------------------------------

                 PARTICULATE AND SO2 DATA WITH CALCULATED VALUES

                              RUN - STK010
                              DATE- 07/26/80

ATMOS  ATMOS  STACK   H2O    PARTIC  STACK  INIT    PERC PERC PERC PITOT
TEMP   PRES   PRES    COND   WT-TTL  AREA   VOL     O2   CO2  CO   TUBE
DG.F) (I.HG) (I.HG)   (ML)   (MG)    (IN2)  (DCF)   DRY  DRY  DRY  COEF

 82   29.56  29.50   100.6   86.00   40828  784.00   7.9 10.7  0.1 0.840

     NBACL2        VT        VTB    VSOLN      VA
      (N)         (ML)       (ML)   (ML)      (ML)

 0.01023000       9.29      0.05   1000.0    10.0


PORT- SAMP  METER    DELTA    DELTA  TEMP TEMP  TRAIN STACK BOX  BATH PROBE   VEL
POINT TIME   VOL       P        H     IN   OUT   VAC  TEMP  TEMP TEMP T DIA
      (MIN) (DCF)  (I.H2O)  (I.H2O)  (F)  (F)  (I.HG)  (F)   (F)  (F)  (IN)  (FPM)

A  1   3.0  784.96  0.500   0.290    92   85    3.4   165   225   68 0.172  2633
A  2   3.0  786.03  0.650   0.380   103   85    3.5   180   240   67 0.172  3038
A  3   3.0  787.15  0.700   0.410   105   86    3.8   177   250   65 0.172  3145
A  4   3.0  788.31  0.750   0.440   109   86    4.0   175   260   63 0.172  3250
A  5   3.0  789.47  0.750   0.440   110   87    4.0   181   250   63 0.172  3266
A  6   3.0  790.64  0.750   0.440   113   88    4.0   183   255   64 0.172  3271
A  7   3.0  791.81  0.750   0.440   114   88    4.0   186   255   62 0.172  3278
D  1   3.0  742.76  0.500   0.290   107   92    3.2   169   270   70 0.172  2641
D  2   3.0  793.85  0.650   0.380   114   92    3.8   172   280   69 0.172  3019
D  3   3.0  794.98  0.700   0.410   116   92    3.9   177   280   68 0.172  3145
D  4   3.0  796.11  0.700   0.410   118   93    4.0   186   275   68 0.172  3167
D  5   3.0  797.29  0.750   0.440   120   94    4.0   182   275   68 0.172  3268
D  6   3.0  798.47  0.750   0.440   120   94    4.0   185   280   66 0.172  3276
D  7   3.0  799.65  0.750   0.440   121   94    4.0   178   275   67 0.172  3258
C  1   3.0  800.61  0.500   0.290   109   97    3.2   168   285   68 0.172  2639
C  2   3.0  801.71  0.650   0.380   118   96    3.8   171   295   68 0.172  3016
C  3   3.0  802.85  0.700   0.410   121   97    3.9   170   295   68 0.172  3128
C  4   3.0  804.00  0.700   0.410   122   97    4.0   175   295   67 0.172  3140
C  5   3.0  805.14  0.700   0.410   123   96    4.0   172   285   66 0.172  3133
C  6   3.0  806.29  0.700   0.410   124   97    4.0   170   290   66 0.172  3128
C  7   3.0  807.44  0.700   0.410   124   97.   4.0   171   290   66 0.172  3130
B  1   3.0  808.41  0.500   0.290   115  100    3.2   158   300   74 0.172  2618
B  2   3.0  809.52  0.600   0.350   122   99    3.7   159   275   73 0.172  2870
B  3   3.0  810.61  0.700   0.410   123   99    4.0   158   265   71 0.172  3098
B  4   3.0  811.78  0.700   0.410   124   99    4.0   165   245   70 0.172  3115
B  5   3.0  812.98  0.750   0.440   125   98    4.1   163   225   67 0.172  3219
B  6   3.0  814.18  0.750   0.440   125   98    4.1   167   245   67 0.172  3230
B  7   3.0  815.38  0.750   0.440   126   98    4.1   168   265   67 0.172  3232
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OUTPUT DATE - 08/27/80                                 KENVIRONS, INC.
       TIME - 15:23:52                                 PROJECT NO. 80019
-------------------------------------------------------------------------
        BECHTEL 1980 DEMO-ACCEPTANCE TEST  -  LG&E CANE RUN NO.6
-------------------------------------------------------------------------

                 PARTICULATE AND SO2 EMISSION DATA

NAME    DESCRIPTION                     UNITS

        TITLE OF RUN                                   ESPA10    ESPB10    STK010
        DATE OF RUN                                  07/26/80  07/26/80  07/26/80
        TIME OF RUN                                 0930-1138 0930-1129 0935-1116
DN      PROBE TIP DIAMETER                   IN     0.238     0.241     0.172
TT      NET TIME OF RUN                     MIN     100.0     100.0      84.0
NP      NUMBER OF SAMPLING POINTS                      50        50        28
Y       DRY GAS METER CALIB. FACTOR                1.0235    1.0340    1.0130
PB      BAROMETRIC PRES, LAB              IN.HG     29.78     29.78     29.78
PBC     BAROMETRIC PRES, CONSOLE          IN.HG     29.73     29.73     29.56
PM      AVG ORF PRES DROP                IN.H2O     0.561     0.550     0.398
VM      VOL DRY GAS-METER COND              DCF     42.84     41.53     31.38
TM      AVG GAS METER TEMP                DEG.F      99.4     108.3     105.1
VMSTD   VOL DRY GAS-STD COND               DSCF     41.18     39.70     29.37
VW      TOTAL H2O COLLECTED                  ML      92.9      86.5     100.6
VWV     VOL H2O VAPOR-STD COND              SCF      4.37      4.07      4.74
PMOS    PERCENT MOISTURE BY VOLUME                    9.6       9.3      13.9
MD      MOLE FRACTION DRY GAS                       0.904     0.907     0.861
PCO2    PERCENT CO2 BY VOLUME, DRY                   11.5      12.8      10.7
PO2     PERCENT O2 BY VOLUME, DRY                     7.0       7.3       7.9
PCO     PERCENT CO BY VOLUME, DRY                     0.0       0.0       0.1
PN2     PERCENT N2 BY VOLUME, DRY                    81.5      80.0      81.3
MWD     MOLECULAR WT-DRY STK GAS                    30.12     30.33     30.03
MW      MOLECULAR WT-STK GAS                        28.96     29.18     28.36
CP      PITOT TUBE COEFFICIENT                      0.840     0.840     0.840
DPS     AVG SQRT STK VEL HEAD            IN.H2O     0.523     0.499     0.823
TS      AVG STACK TEMPERATURE             DEG.F     300.4     291.9     172.5
PS      STACK PRESSURE, ABSOLUTE          IN.HG     28.57     28.64     29.50
VS      AVG STACK GAS VELOCITY              FPM      2160      2040      3080
AS      STACK AREA                          IN2     33618     33618     40828
QS      STK FLOWRATE, DRY, STD            DSCFM    302000    290000    620000
QA      ACTUAL STACK FLOWRATE              ACFM    505000    476000    874000
PERI    PERCENT ISOKINETIC                          102.9     100.9      99.2
MT      PARTICULATE WT-TOTAL                 MG   1216.70    710.20     86.00
CAN     PART. LOAD-TTL, STD             GR/DSCF     0.456     0.276     0.045
C       PART. LOAD-TTL, STD             LB/DSCF .00006510 .00003940 .00000645
CAT     PART. LOAD-TTL, STK              GR/ACF     0.273     0.168     0.032
CAW     PART. EMIS-TOTAL                  LB/HR 1181.9692  686.0000  240.0000
E       EMISSION RATE                  LB/MMBTU    0.9620    0.5930    0.1020
F       F FACTOR                     DSCF/MMBTU      9820      9820      9820
SCONC   SO2, CONC., STD                 LB/DSCF  4.00E-04  3.92E-04  2.27E-05
SCONCA  SO2, CONC., STK                  LB/ACF  2.40E-04  2.39E-04  1.61E-05
SCHR    SO2 EMISSION RATE                 LB/HR  7256.073  6816.098   845.000
SCMM    SO2 EMISSION RATE              LB/MMBTU     5.900     5.890     0.359
SCPPM   SO2, CONC., STD                     PPM      2410      2360       137
SCPPMA  SO2, CONC., STK                     PPM      2180      2140       118
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Appendix J. Calibration Data

(Sequence: Dry Gas Meter Orifice Calibration, Pre and Post (pg J-1); Nozzle Calibration (pg J-16); Thermocouple Calibration (pg J-20); Dry Gas Meter Dial Thermometer Calibration (pg J-26); Hot and Cold Box Dial Thermometer Calibration (pg J-28); Barometer Calibration (pg J-30); Pitot Calibration (pg J-32); and Kenvirons Results, EPA Inter-laboratory Study, 11/79 and 9/80 (pg J-35))

Dry Gas Meter Orifice Calibration, Pre and Post

KENVIRONS, INC.
DRY GAS METER AND ORIFICE
CALIBRATION FORM

METER NO. 713856 Con. 328

DATE 5/5/80

BAROMETRIC PRESSURE 29.00 in. Hg.

LEAK RATE (Pre) 0.001 cfm @ 7 in Hg

OPERATOR D.M. FISHER

LEAK RATE (Post) 0.000 cfm @ 12 in Hg

Orifice Manometer Setting (ΔH), in. H_2O	Pressure Reference Meter (Pr), in. H_2O	Reference Meter (V_r) ft^3	Dry Gas Meter (V_m) ft^3	Meter Temperatures				Time θ Min.
				Ref.	Dry Gas			
				tr, °F	Inlet t_{di}, °F	Outlet t_{do}, °F	Average t_d, °F	
0.10	-0.1	5.002	5.365	77	114	90	102	30.6
0.25	-0.1	5.001	5.350	77	116	91	103.5	17.5
0.50	-0.1	5.004	5.330	77	119	92	105.5	12.35
0.75	-0.1	5.163	5.468	78	120	94	107	10.48
1.00	-0.1	5.001	5.316	78	122	94	108	8.9
2.00	-0.1	5.061	5.313	78	124	96	110	6.3
3.00	-0.1	5.105	5.316	78	122	96	109	5.25

FLOW RATE DETERMINATION (Cr = correction factor from calibration of reference meter against wet test meter)

ΔH	$Q = 17.65 \dfrac{P_b + \frac{P_r}{13.6}}{(t_r + 460)} \dfrac{(V_r \times C_r)}{\theta} =$	CFM	YR*
0.10	17.65 $\dfrac{(29.007)}{(537)}\dfrac{(5.002}{(30.6)}\ 1.034) =$	.1611 =	1.0218
0.25	17.65 $\dfrac{(29.007)}{(537)}\dfrac{(5.001}{(17.5)}\ 1.034) =$	.2809 =	1.0257
0.50	17.65 $\dfrac{(29.007)}{(537)}\dfrac{(5.004}{(12.35)}\ 1.034) =$	.3994 =	1.0289
0.75	17.65 $\dfrac{(29.007)}{(538)}\dfrac{(5.163}{(10.48)}\ 1.034) =$	.4847 =	1.0314
1.00	17.65 $\dfrac{(29.007)}{(538)}\dfrac{(5.001}{(8.9)}\ 1.034) =$	.5529 =	1.0334
2.00	17.65 $\dfrac{(29.007)}{(538)}\dfrac{(5.061}{(6.3)}\ 1.034) =$	.7904 =	1.0408
3.00	17.65 $\dfrac{(29.007)}{(538)}\dfrac{(5.105}{(5.25)}\ 1.034) =$	.9528 =	1.0456

*YR is the correction factor derived from the reference meter calibration curve for the individual orifice setting flow rates.

· **Calibration Form**

CALCULATIONS

$$Y = YR\left[\frac{V_r\left[Pb + \left|\frac{Pr}{13.6}\right|\right](td + 460)}{V_m\left[Pb + \left|\frac{\Delta H}{13.6}\right|\right](tr + 460)}\right]$$

ΔH	$\frac{\Delta H}{13.6}$	
0.10	0.007	$\left(\frac{1.0218}{}\right)\left(\frac{5.002}{5.365}\right)\left(\frac{29.007}{29.007}\right)\left(\frac{562}{537}\right) = 0.997$
0.25	0.018	$\frac{}{1.0257}\left(\frac{5.001}{5.350}\right)\left(\frac{29.007}{29.018}\right)\left(\frac{563.5}{537}\right) = 1.0057$
0.50	0.037	$\frac{}{1.0289}\left(\frac{5.004}{5.330}\right)\left(\frac{29.007}{29.037}\right)\left(\frac{565.5}{537}\right) = 1.0162$
0.75	0.055	$\frac{}{1.0314}\left(\frac{5.163}{5.488}\right)\left(\frac{29.007}{29.055}\right)\left(\frac{567}{538}\right) = 1.0209$
1.00	0.074	$\frac{}{1.0334}\left(\frac{5.001}{5.316}\right)\left(\frac{29.007}{29.074}\right)\left(\frac{568}{538}\right) = 1.024$
2.00	0.147	$\frac{}{1.0408}\left(\frac{5.061}{5.313}\right)\left(\frac{29.007}{29.147}\right)\left(\frac{570}{538}\right) = 1.0453$
3.00	0.221	$\frac{}{1.0456}\left(\frac{5.105}{5.316}\right)\left(\frac{29.007}{29.221}\right)\left(\frac{569}{538}\right) = 1.0542$

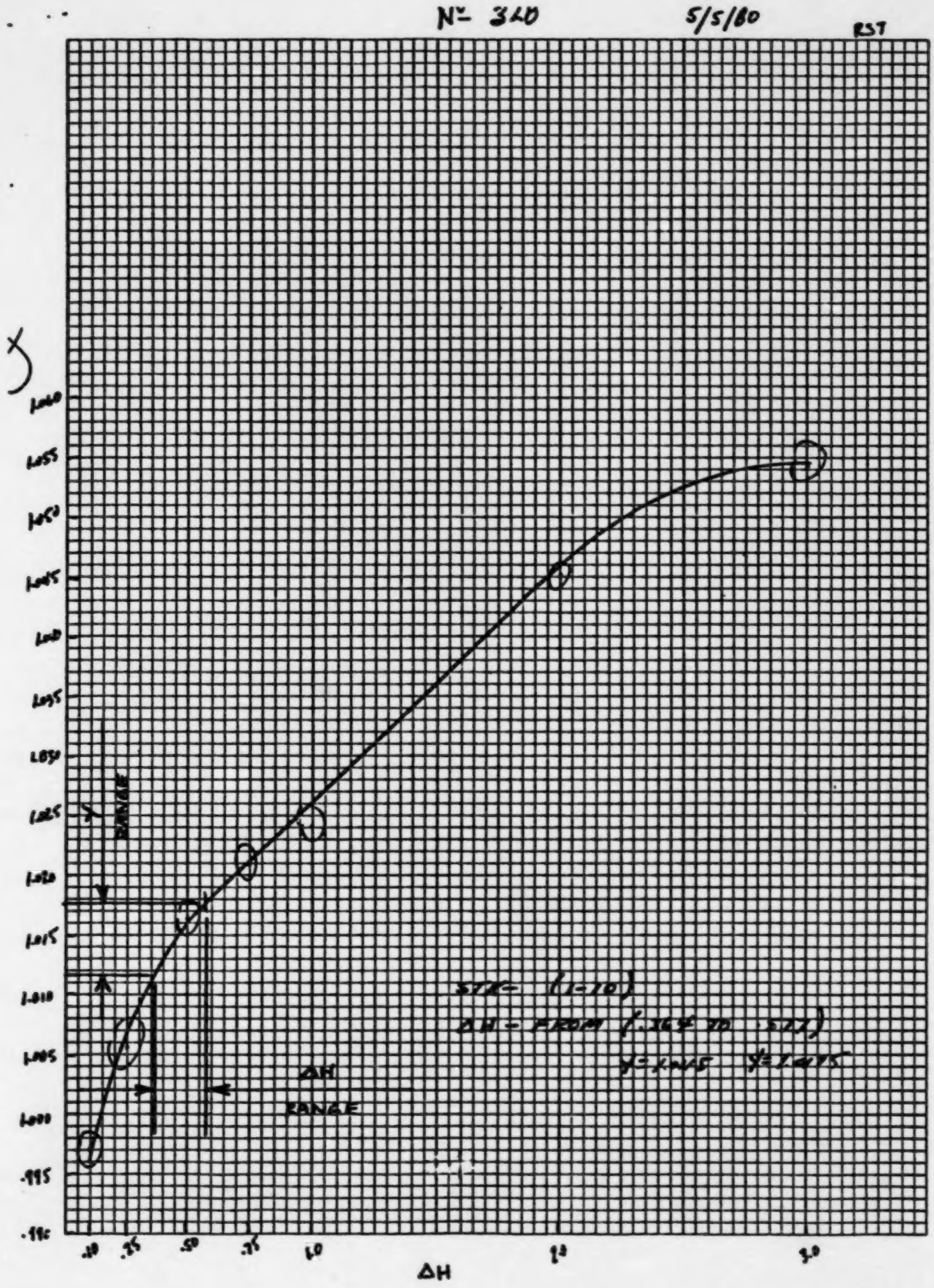
AVERAGE 1.0233

$$\Delta H@ = \frac{0.0317\ (\Delta H)}{\left[Pb + \left|\frac{Pr}{13.6}\right|\right](td + 460)}\left[\frac{(tr + 460)\ \theta}{Vr \times Yr}\right]^2$$

ΔH	$\Delta H@$
0.10	$\frac{.0317\ (.10)}{(29.007)(562)} = 1.9445^{-7}\ \left[\left(\frac{537}{5.002}\right)\left(\frac{30.6}{1.0218}\right)\right]^2 = 2.0099$
0.25	$\frac{.0317\ (.25)}{(29.007)(563.5)} = 4.8484^{-7}\ \left[\left(\frac{537}{5.001}\right)\left(\frac{17.5}{1.0257}\right)\right]^2 = 1.6273$
* 0.50	$\frac{.0317\ (.5)}{(29.007)(565.5)} = 9.6625^{-7}\ \left[\left(\frac{537}{5.004}\right)\left(\frac{12.35}{1.0289}\right)\right]^2 = 1.6032$
0.75	$\frac{.0317\ (.75)}{(29.007)(567)} = 1.4455^{-6}\ \left[\left(\frac{538}{5.163}\right)\left(\frac{10.48}{1.0314}\right)\right]^2 = 1.6205$
1.00	$\frac{.0317\ (1)}{(29.007)(568)} = 1.924^{-6}\ \left[\left(\frac{538}{5.001}\right)\left(\frac{8.9}{1.0334}\right)\right]^2 = 1.6516$
2.00	$\frac{.0317\ (2)}{(29.007)(570)} = 3.8345^{-6}\ \left[\left(\frac{538}{5.061}\right)\left(\frac{6.3}{1.0408}\right)\right]^2 = 15919$
3.00	$\frac{.0317\ (3)}{(29.007)(569)} = 5.7618^{-4}\ \left[\left(\frac{538}{5.105}\right)\left(\frac{5.25}{1.0456}\right)\right]^2 = 1.6133$

AVERAGE 1.673

AVERAGE Y = 1.02 **AVERAGE ΔH@** = 1.67


Nº 320
5/5/80
RST
γ
1.060
1.055
1.050
1.045
1.040
1.035
1.030
1.025
1.020
1.015
1.010
1.005
1.000
.995
.990
γ RANGE
ΔH RANGE
STK- (1-10)
ΔH - FROM (.364 TO .572)
γ=1.0115 γ=1.0175
.10
.25
.50
.75
1.0
2.0
3.0
ΔH

POST TEST PROJECT BECHTEL
PROJECT NUMBER 80019
DATE OF RUN (7-17-80) (7-27-80)
LOCATION ARG- STK-

KENVIRONS, INC.
DRY GAS METER AND ORIFICE
[✓ POST-TEST] CALIBRATION CHECK

TER NO. D-328 DATE 7-31-80

METRIC PRESSURE 29.40 in. Hg. LEAK RATE (Pre) .000 cfm @ 10" Hg.

RMEDIATE ORIFICE SETTING[a] .50 (ΔH) LEAK RATE (Post)

IMUM VACUUM[a] 7 in. Hg. OPERATOR RST

ermediate orifice setting is based on the previous field test, with the vacuum set at ximum value reached during the test series.

eck No.	Pressure Reference Meter (Pr), in. H_2O	VOLUME		Meter Temperatures				Ti θ Mi
		Reference Meter (V_r) ft^3	Dry Gas Meter (Vm) ft^3	Reference tr. °F	Dry Gas			
					Inlet tdi, °F	Outlet tdo, °F	Average td, °F	
	-0.1	5.000	5.227	87	125	97	111	12.2
2	-0.1	5.000	5.248	87	128	100	114	12.2
3	-0.1	5.000	5.281	89	129	101	115	12.2

RATE DETERMINATION (Cr = correction factor from calibration of reference meter agains wet test meter)

	$Q = 17.65 \dfrac{(Pb + \frac{Pr}{13.6})}{(t_r + 460)} \dfrac{(Vr) X Cr}{(\theta)} =$	CFM	YR*
n 1	$17.65 \dfrac{(29.407)}{(547)} \dfrac{(5.000)}{(12.25)} \dfrac{1.034}{} =$	.4005=	·1.0291
n 2	$17.65 \dfrac{(29.407)}{(547)} \dfrac{(5.000)}{(12.23)} \dfrac{1.034}{} =$	.4011 =	1.0290
n 3	$17.65 \dfrac{(29.407)}{(549)} \dfrac{(5.000)}{(12.25)} \dfrac{1.034}{} =$	.3990=	1.0289

is the correction factor derived from the reference meter calibration curve for the ividual orifice setting flow rates.

POST-TEST CALIBRATION FORM

$$Y = \underline{YR}\left[\frac{(V_r)\left[Pb + \left(\frac{Pr}{13.6}\right)\right]\ (td + 460)}{(V_m)\left[Pb + \left(\frac{\Delta H}{13.6}\right)\right]\ (tr + 460)}\right]$$

$$\underline{1.0291}\left[\frac{(5.000)(29.407)(571)}{(5.227)(29.437)(547)}\right] = 1.0266$$

$$\underline{1.0290}\left[\frac{(5.000)(29.407)(574)}{(5.248)(29.437)(547)}\right] = 1.0278$$

$$\underline{1.0289}\left[\frac{(5.000)(29.407)(575)}{(5.281)(29.437)(549)}\right] = 1.0192$$

AVERAGE 1.0245

$$\Delta H@ = \frac{0.0317\ (\Delta H)}{\left[Pb + \left(\frac{Pr}{13.6}\right)\right](td + 460)} = \underline{\qquad\qquad} \times \left[\frac{(tr + 460)\ (\theta)}{(Vr)\ (Yr)}\right]^2$$

$$\frac{.0317\ (0.50)}{(29.437)(571)} = \underline{9.4297\ x10^{-7}} \times \left[\frac{(547)(12.25)}{(5.000)(1.0291)}\right]^2 = 1.5992$$

$$\frac{.0317\ (0.50)}{(29.437)(574)} = \underline{9.3804\ x10^{-7}} \times \left[\frac{(547)(12.23)}{(5.000)(1.0290)}\right]^2 = 1.5859$$

$$\frac{.0317\ (0.50)}{(29.437)(575)} = \underline{9.3641\ x10^{-7}} \times \left[\frac{(549)(12.25)}{(5.000)(1.0289)}\right]^2 = 1.6003$$

AVERAGE 1.5951

AVERAGE Y = 1.02

AVERAGE ΔH@ = 1.60

[c] If the calibration has changed by more than five percent from previous full scale calibration, the meter must be recalibrated over the full range of orifice settings.

	Previous Value	± 5% Range	Accept	Recalibrate	By
Y	Ave. 1.0233	.9721 — 1.0745	✓		RST
ΔH@	Ave. 1.6739	1.5902 - 1.7575	✓		RST
ΔH Curve					

PRE BECHTEL

KENVIRONS, INC.
DRY GAS METER AND ORIFICE CALIBRATION FORM

METER NO. 713856 em 467

DATE 5-7-80

BAROMETRIC PRESSURE 29.00 in. Hg.

LEAK RATE (Pre) < .001 @ 11" Hg.

OPERATOR D.M. FISHER

LEAK RATE (Post) < .001 @ 14" Hg.

Orifice Manometer Setting (ΔH), in. H_2O	Pressure Reference Meter (Pr), in. H_2O	Reference Meter(V_r) ft^3	Dry Gas Meter(V_m) ft^3	Meter Temperatures				Time θ Min.
				Ref.	Dry Gas			
				tr, °F	Inlet t_{di}, °F	Outlet t_{do}, °F	Average t_d, °F	
0.10	-0.1	5.000	5.336	70	117	90	101	32.17
0.25	-0.1	5.000	5.281	71	114	90	102	17.70
0.50	-0.1	5.001	5.300	71	116	91	103.5	12.40
0.75	-0.1	5.000	5.278	71	117	92	104.5	10.23
1.00	-0.1	5.004	5.274	71	118	93	105.5	8.88
2.00	-0.1	10.005	10.398	71	120	93	106.5	12.76
3.00	-0.1	10.003	10.278	71	122	94	108	10.22

FLOW RATE DETERMINATION (Cr = correction factor from calibration of reference meter against wet test meter)

ΔH	$Q = 17.65 \frac{Pb + \frac{Pr}{13.6}}{(t_r + 460)} \frac{(Vr \times Cr)}{\theta} =$	CFM	YR*
0.10	$17.65 \left(\frac{29.007}{530}\right)\left(\frac{5.000}{32.17}\right) 1.034 =$	.1552 =	1.0218
0.25	$17.65 \left(\frac{29.007}{531}\right)\left(\frac{5.000}{17.70}\right) 1.034 =$	= .2816	1.0254
0.50	$17.65 \left(\frac{29.007}{531}\right)\left(\frac{5.001}{12.40}\right) 1.034 =$	= .4021	1.0291
0.75	$17.65 \left(\frac{29.007}{531}\right)\left(\frac{5.000}{10.23}\right) 1.034 =$	= .4873	1.0318
1.00	$17.65 \left(\frac{29.007}{531}\right)\left(\frac{5.004}{8.88}\right) 1.034 =$	= .5618	1.0341
2.00	$17.65 \left(\frac{29.007}{531}\right)\left(\frac{10.005}{12.76}\right) 1.034 =$	= .7817	1.0404
3.00	$17.65 \left(\frac{29.007}{531}\right)\left(\frac{10.003}{10.22}\right) 1.034 =$	= .9758	1.0462

*YR is the correction factor derived from the reference meter calibration curve for the individual orifice setting flow rates.

Calibration Form

CALCULATIONS

$$Y = YR \left[\frac{V_r \left[Pb + \left|\frac{Pr}{13.6}\right|\right](td + 460)}{V_m \left[Pb + \left|\frac{\Delta H}{13.6}\right|\right](tr + 460)} \right]$$

ΔH	$\frac{\Delta H}{13.6}$		
0.10	0.007	$\underline{1.0218} \left(\frac{5}{5.336}\right)\left(\frac{29.007}{29.007}\right)\left(\frac{561}{530}\right) =$	1.0135
0.25	0.018	$\underline{1.0254} \left(\frac{5}{5.281}\right)\left(\frac{29.007}{29.018}\right)\left(\frac{562}{531}\right) =$	1.0271
0.50	0.037	$\underline{1.0291} \left(\frac{5.001}{5.3}\right)\left(\frac{29.007}{29.037}\right)\left(\frac{563.5}{531}\right) =$	1.0297
0.75	0.055	$\underline{1.0318} \left(\frac{5}{5.278}\right)\left(\frac{29.007}{29.055}\right)\left(\frac{564.5}{531}\right) =$	1.0374
1.00	0.074	$\underline{1.0341} \left(\frac{5.004}{5.274}\right)\left(\frac{29.007}{29.074}\right)\left(\frac{565.5}{531}\right) =$	1.0425
2.00	0.147	$\underline{1.0404} \left(\frac{10.005}{10.398}\right)\left(\frac{29.007}{29.147}\right)\left(\frac{566.5}{531}\right) =$	1.0625
3.00	0.221	$\underline{1.0462} \left(\frac{10.003}{10.278}\right)\left(\frac{29.007}{29.221}\right)\left(\frac{568}{531}\right) =$	1.0812

AVERAGE 1.042

$$\Delta H@ = \frac{0.0317\ (\Delta H)}{\left[Pb + \left|\frac{Pr}{13.6}\right|\right](td + 460)} \left[\frac{(tr + 460)\ \theta}{Vr\ \ x_1\ \ Yr}\right]^2$$

ΔH	ΔH@	
0.10	$\frac{.0317\ (.1)}{(29.007)(561)} = \underline{1.9490 \times 10^{-7}} \times \left[\left(\frac{530}{5}\right)\left(\frac{32.17}{1.0218}\right)\right]^2 =$	2.170
0.25	$\frac{.0317\ (.25)}{(29.007)(562)} = \underline{4.8613 \times 10^{-7}} \times \left[\left(\frac{531}{5}\right)\left(\frac{17.7}{1.0254}\right)\right]^2 =$	1.634
0.50	$\frac{.0317\ (.50)}{(29.007)(563.5)} = \underline{9.6968 \times 10^{-7}} \times \left[\left(\frac{531}{5.001}\right)\left(\frac{12.4}{1.0291}\right)\right]^2 =$	1.587
0.75	$\frac{.0317\ (.75)}{(29.007)(564.5)} = \underline{1.4519 \times 10^{-6}} \times \left[\left(\frac{531}{5}\right)\left(\frac{10.23}{1.0318}\right)\right]^2 =$	1.610
1.00	$\frac{.0317\ (1.00)}{(29.007)(565.5)} = \underline{1.9325 \times 10^{-6}} \times \left[\left(\frac{531}{5.004}\right)\left(\frac{8.98}{1.0341}\right)\right]^2 =$	1.605
2.00	$\frac{.0317\ (2.00)}{(29.007)(566.5)} = \underline{3.8582 \times 10^{-6}} \times \left[\left(\frac{531}{10.005}\right)\left(\frac{12.76}{1.0404}\right)\right]^2 =$	1.635
3.00	$\frac{.0317\ (3.00)}{(29.007)(568)} = \underline{5.7720 \times 10^{-6}} \times \left[\left(\frac{531}{10.003}\right)\left(\frac{10.22}{1.0462}\right)\right]^2 =$	1.552

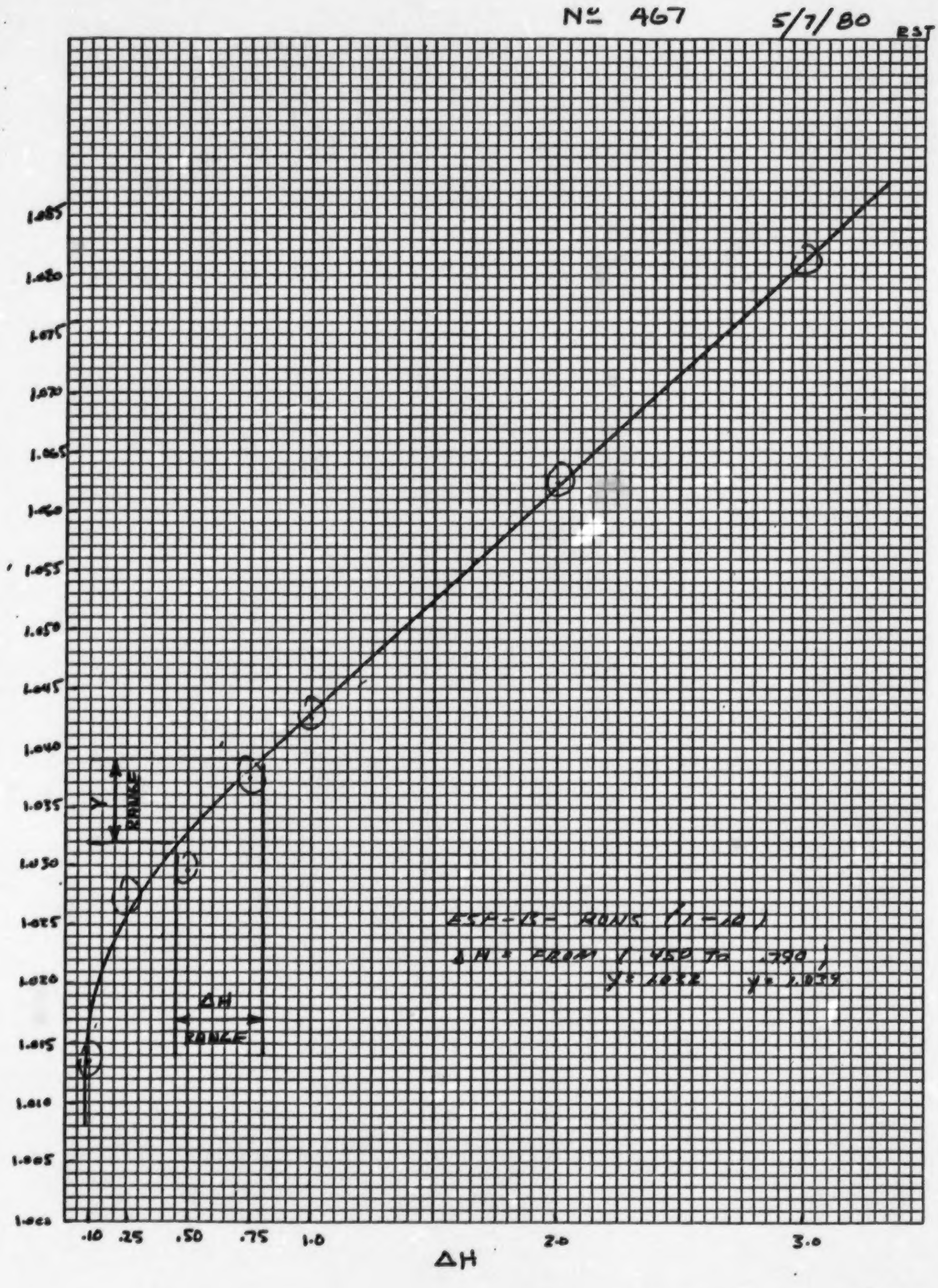
AVERAGE 1.684

1,04

AVERAGE Y = 1.042

1.68

AVERAGE ΔH@ = 1.684


No 467
5/7/80
EST
1.085
1.080
1.075
1.070
1.065
1.060
1.055
1.050
1.045
1.040
1.035
1.030
1.025
1.020
1.015
1.010
1.005
1.000
Y
RANGE
ΔH
RANGE
ESP-13- RUNS (1-12)
ΔH = FROM (.450 To .790)
Y = 1.032 Y = 1.039
.10
.25
.50
.75
1.0
2.0
3.0
ΔH

POST TEST PROJECT [illegible]
PROJECT NUMBER 80019
DATE OF RUN (7-17-80) (7-22-80)
LOCATION CR6- ESP-B

KENVIRONS, INC.
DRY GAS METER AND ORIFICE
[✓ POST-TEST] CALIBRATION CHECK

R NO. D- 467
DATE 7-31-80
METRIC PRESSURE 29.40 in. Hg.
LEAK RATE (Pre) .001 cfm @ 7" Hg.
ERMEDIATE ORIFICE SETTING* .50 (ΔH)
LEAK RATE (Post) .001 cfm @ 7" Hg.
MUM VACUUM* 7 in. Hg.
OPERATOR RST

*ermediate orifice setting is based on the previous field test, with the vacuum set a imum value reached during the test series.

heck n No.	Pressure Reference Meter (Pr), in. H_2O	VOLUME		Meter Temperatures				T: (M:
		Reference Meter (V_r) ft^3	Dry Gas Meter (Vm) ft^3	Reference tr. °F	Dry Gas Inlet tdi, °F	Dry Gas Outlet tdo, °F	Dry Gas Average td, °F	
1	-0.1	5.000	5.370	79	120	95	107.5	12.
2	-0.1	5.000	5.384	79	122	96	109.0	12.
3	-0.1	5.300	5.710	79	122	97	109.5	13

W RATE DETERMINATION (Cr = correction factor from calibration of reference meter agai wet test meter)

	$Q = 17.65 \frac{\left(Pb + \frac{Pr}{13.6}\right)(Vr) \times Cr}{(t_r + 460)\ (\theta)} =$	CFM	YR*
un 1	$17.65 \frac{(29.407)(5.000)}{(539)(12.50)} 1.034 =$	.3983 =	1.0299
un 2	$17.65 \frac{(29.407)(5.000)}{(539)(12.47)} 1.034 =$	.3992 =	1.0290
n 3	$17.65 \frac{(29.407)(5.300)}{(539)(13.18)} 1.034 =$	.4004 =	1.0291

is the correction factor derived from the reference meter calibration curve for the ividual orifice setting flow rates.

$$Y = \underline{YR}\left[\frac{(V_r)\left[Pb + \left(\frac{Pr}{13.6}\right)\right](td + 460)}{(V_m)\left[Pb + \left(\frac{\Delta H}{13.6}\right)\right](tr + 460)}\right]$$

$$\underline{1.0289}\left[\frac{(5.000)(29.407)(567.5)}{(5.370)(29.437)(539)}\right] = 1.0076$$

$$\underline{1.0290}\left[\frac{(5.000)(29.407)(569)}{(5.384)(29.437)(539)}\right] = 1.0078$$

$$\underline{1.0291}\left[\frac{(5.300)(29407)(569.5)}{(5.710)(29.437)(539)}\right] = 1.0082$$

AVERAGE 1.0079

$$\Delta H@ = \frac{0.0317\,(\Delta H)}{\left[Pb + \left(\frac{Pr}{13.6}\right)\right](td + 460)} = \underline{\qquad} \times \left[\frac{(tr + 460)\quad(\theta)}{(Vr)\quad(Yr)}\right]^2$$

$$\frac{.0317\,(.50)}{(29.407)(567.5)} = \underline{9.4975 \times 10^{-7}} \times \left[\frac{(539)(12.50)}{(5.000)(1.0289)}\right]^2 = 1.6290$$

$$\frac{.0317\,(.50)}{(29407)(569)} = \underline{9.4775 \times 10^{-7}} \times \left[\frac{(539)(12.47)}{(5.000)(1.0290)}\right]^2 = 1.6166$$

$$\frac{.0317\,(.50)}{(29.407)(5695)} = \underline{9.4642 \times 10^{-7}} \times \left[\frac{(539)(13.18)}{(5.300)(1.0291)}\right]^2 = 1.6056$$

AVERAGE 1.6171

AVERAGE Y = 1.01

AVERAGE ΔH@ = 1.62

[c] If the calibration has changed by more than five percent from previous full scale calibration, the meter must be recalibrated over the full range of orifice settings.

	Previous Value	± 5% Range	Accept	Recalibrate	By
Y	Ave. 1.05	1.1025 - .9975	✓		RST
ΔH@	Ave. 1.56	1.638 - 1.482	✓		RST
ΔH Curve					

PRE ~~POST~~ TEST PROJECT BECHTEL #2
PROJECT NUMBER 80019
DATE OF RUN ( ) ( )
LOCATION L.G.E Trailer

KENVIRONS, INC.
DRY GAS METER AND ORIFICE
POST-TEST CALIBRATION CHECK

TER NO. D-494
ROMETRIC PRESSURE 29.73 in. Hg.
TERMEDIATE ORIFICE SETTING* 0.50 (ΔH)
IMUM VACUUM* 7 in. Hg.

DATE 7-11-80
LEAK RATE (Pre) 0.000 CFM @ 11" Hg.
LEAK RATE (Post) 0.000 CFM @ 11" Hg.
OPERATOR RST

ntermediate orifice setting is based on the previous field test, with the vacuum set at
ximum value reached during the test series.

heck n No.	Pressure Reference Meter (Pr), in. H_2O	VOLUME		Meter Temperatures				Ti θ Mi
		Reference Meter(V_r) ft^3	Dry Gas Meter(Vm) ft^3	Reference tr. °F	Dry Gas			
					Inlet tdi, °F	Outlet tdo, °F	Average td, °F	
-	-.07	5.000	5.077	84	101	94	97.5	12.
2	-.01	5.000	5.103	84	101	94	97.5	12.0
3	-.01	5.000	5.114	83	100	94	97-	12.0

W RATE DETERMINATION (Cr = correction factor from calibration of reference meter again wet test meter)

	$Q = 17.65$	$\dfrac{\left(Pb + \frac{Pr}{13.6}\right)}{(t_r + 460)} \dfrac{(Vr) \times Cr}{(\theta)} =$	CFM	YR*
Run 1	17.65	$\dfrac{(29.731)}{(544)} \dfrac{(5.000)}{(12.0)} \dfrac{1.034}{[illegible]} =$	.4156=	1.0296
Run 2	17.65	$\dfrac{(29.731)}{(544)} \dfrac{(5.000)}{(12.06)} \dfrac{1.034}{[illegible]} =$	.4135=	1.0292
un 3	17.65	$\dfrac{(29.731)}{(543)} \dfrac{(5.000)}{(12.08)} \dfrac{1.034}{[illegible]} =$	.4136=	1.0293

is the correction factor derived from the reference meter calibration curve for the uividual orifice setting flow rates.

POST-TEST CALIBRATION FORM

$$Y = \underline{YR}\left[\frac{(V_r)\left[Pb + \left(\frac{Pr}{13.6}\right)\right](td + 460)}{(V_m)\left[Pb + \left(\frac{\Delta H}{13.6}\right)\right](tr + 460)}\right]$$

$$\underline{1.0296}\left[\frac{(5.000)(29.731)(557.5)}{(5.077)(29.767)(544)}\right] = 1.0379$$

$$\underline{1.0292}\left[\frac{(5.000)(29.731)(557.5)}{(5.103)(29.767)(544)}\right] = 1.0322$$

$$\underline{1.0293}\left[\frac{(5.000)(29.731)(557)}{(5.114)(29.767)(543)}\right] = 1.0311$$

AVERAGE 1.0337

$$\Delta H@ = \frac{0.0317\,(\Delta H)}{\left[Pb + \left(\frac{Pr}{13.6}\right)\right](td + 460)} = \underline{\qquad} \times \left[\frac{(tr + 460)\ (\theta)}{(Vr)\ (Yr)}\right]^2$$

$$\frac{.0317(.50)}{(29.731)(557.5)} = \underline{9.5625755 \times 10^{-7}} \times \left[\frac{(544)(12.0)}{(5.000)(1.0296)}\right]^2 = 1.5376$$

$$\frac{.0317(.50)}{(29.731)(557.5)} = \underline{9.5625755 \times 10^{-7}} \times \left[\frac{(544)(12.06)}{(5.000)(1.0292)}\right]^2 = 1.5543$$

$$\frac{.0317(.50)}{(29.731)(557)} = \underline{9.5711595 \times 10^{-7}} \times \left[\frac{(543)(12.08)}{(5.000)(1.0293)}\right]^2 = 1.5548$$

AVERAGE 1.5489

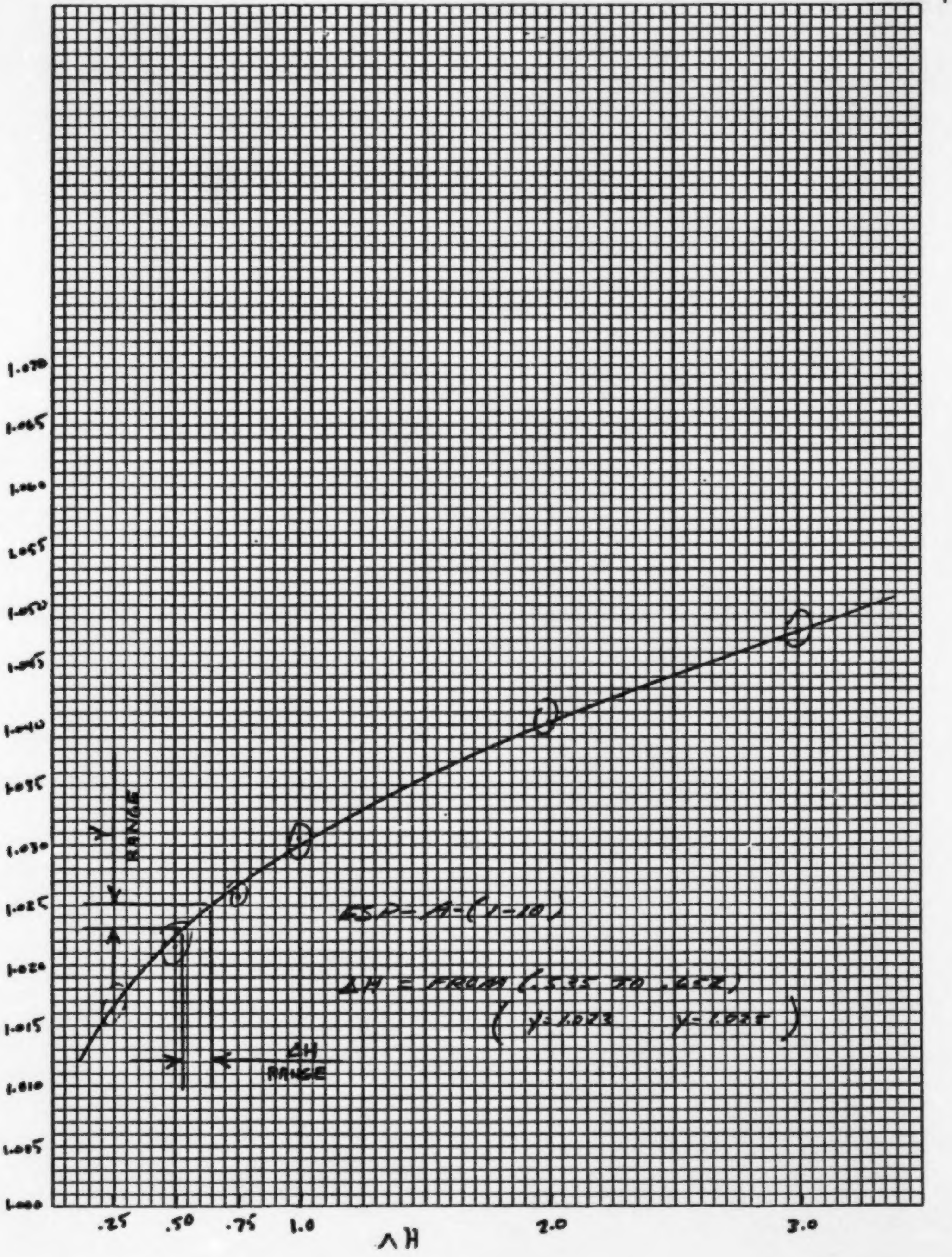
AVERAGE Y = 1.03

AVERAGE ΔH@ = 1.55

[c] If the calibration has changed by more than five percent from previous full scale calibration, the meter must be recalibrated over the full range of orifice settings.

	Previous Value	± 5% Range	Accept	Recalibrate	By
Y	Ave. 1.0305	.9789-1.0820	✓		RST
ΔH@	Ave. 1.5525	1.4749-1.6301	✓		RST
ΔH Curve					

CONSOLE No 444 RST



POST TEST PROJECT BECHTEL
PROJECT NUMBER B0019
DATE OF RUN (7-17-80) (7-27-80)
LOCATION CRG- ESP-A

KENVIRONS, INC.
DRY GAS METER AND ORIFICE
POST-TEST CALIBRATION CHECK

ER NO. D-494
DATE 7-31-80
ROMETRIC PRESSURE 29.40 in. Hg.
LEAK RATE (Pre) .001 CFM @ 9.5"H
ERMEDIATE ORIFICE SETTING* 0.50 (ΔH)
LEAK RATE (Post) .000 CFM @ 9.5"H
IMUM VACUUM* 7 in. Hg.
OPERATOR RST

ntermediate orifice setting is based on the previous field test, with the vacuum set a
ximum value reached during the test series.

eck n No.	Pressure Reference Meter (Pr), in.H_2O	VOLUME		Meter Temperatures				T M
		Reference Meter(V_r) ft^3	Dry Gas Meter(Vm) ft^3	Reference	Dry Gas			
				tr. °F	Inlet tdi, °F	Outlet tdo, °F	Average td, °F	
	-0.1	5.000	5.133	79	99	86	92.5	11.6
2	-0.1	5.000	5.190	80	100	91	95.5	11.6
3	-0.1	5.000	5.197	80	103	94	97.5	11.

w RATE DETERMINATION (Cr = correction factor from calibration of reference meter agai
wet test meter)

	$Q = 17.65 \frac{\left(Pb + \frac{Pr}{13.6}\right)(Vr) \times Cr}{(t_r + 460)\ (\theta)} =$	CFM	YR*
un 1	$17.65 \frac{(29.407)(5.000)\ 1.034}{(539)(11.85)} =$	.4201 =	1.0296
un 2	$17.65 \frac{(29.407)(5.000)\ 1.034}{(540)(11.87)} =$	.4186 =	1.0293
n 3	$17.65 \frac{(29.407)(5.000)\ 1.034}{(540)(11.85)} =$	.4193 =	1.0294

is the correction factor derived from the reference meter calibration curve for the
vidual orifice setting flow rates.

$$Y = \underline{YR}\left[\frac{(V_r)\left[Pb + \left(\frac{Pr}{13.6}\right)\right]\ (td + 460)}{(V_m)\left[Pb + \left(\frac{\Delta H}{13.6}\right)\right]\ (tr + 460)}\right]$$

$$\underline{1.0296}\left[\frac{(5.000)(29.407)(552.5)}{(5.133)(29.437)(539)}\right] = 1.0270$$

$$\underline{1.0293}\left[\frac{(5.000)(29.407)(555.5)}{(5.190)(29.437)(540)}\right] = 1.0190$$

$$\underline{1.0294}\left[\frac{(5.000)(29.407)(557.5)}{(5.197)(29.437)(540)}\right] = 1.0214$$

AVERAGE 1.0225

$$\Delta H@ = \frac{0.0317\ (\Delta H)}{\left[Pb + \left(\frac{Pr}{13.6}\right)\right](td + 460)} = \underline{\qquad} \times \left[\frac{(tr + 460)\ (\theta)}{(Vr)\ (Yr)}\right]^2$$

$$\frac{.0317\,(.50)}{(29.407)(552.5)} = \underline{9.7554 \times 10^{-7}} \times \left[\frac{(539)(11.85)}{(5.000)(1.0296)}\right]^2 = 1.5017$$

$$\frac{.0317\,(.50)}{(29.407)(555.5)} = \underline{9.7027 \times 10^{-7}} \times \left[\frac{(540)(11.87)}{(5.000)(1.0293)}\right]^2 = 1.5051$$

$$\frac{.0317\,(.50)}{(29.407)(557.5)} = \underline{9.6679 \times 10^{-7}} \times \left[\frac{(540)(11.85)}{(5.000)(1.0294)}\right]^2 = 1.4943$$

AVERAGE 1.5004

AVERAGE Y = 1.02

AVERAGE ΔH@ = 1.50

[c] If the calibration has changed by more than five percent from previous full scale calibration, the meter must be recalibrated over the full range of orifice settings.

	Previous Value	± 5% Range	Accept	Recalibrate	By
Y	Ave. 1.0305	.97896 - 1.0820	✓		RST
ΔH@	Ave. 1.5525	1.4749 - 1.6301	✓		RST
ΔH Curve					

Nozzle Calibration

NOZZLE ID # 231

DATE: 12-4-79
MEASURED BY: RST

MEASUREMENT NO.	DIAMETER
1	.240
2	.241
3	.240
AVG.	.240

DATE: 1-15-80
MEASURED BY: RST

MEASUREMENT NO.	DIAMETER
1	.236
2	.239
3	.239
AVG.	.238

DATE: 8-5-80
MEASURED BY: RST

MEASUREMENT NO.	DIAMETER
1	.239
2 BECHTEL POST	.237
3	.241
AVG.	.239

DATE:
MEASURED BY:

MEASUREMENT NO.	DIAMETER
1	
2	
3	
AVG.	

DATE:
MEASURED BY:

MEASUREMENT NO.	DIAMETER
1	
2	
3	
AVG.	

DATE:
MEASURED BY:

MEASUREMENT NO.	DIAMETER
1	
2	
3	
AVG.	

DATE:
MEASURED BY:

MEASUREMENT NO.	DIAMETER
1	
2	
3	
AVG.	

DATE:
MEASURED BY:

MEASUREMENT NO.	DIAMETER
1	
2	
3	
AVG.	

DATE:
MEASURED BY:

MEASUREMENT NO.	DIAMETER
1	
2	
3	
AVG.	

The difference between the high and low readings shall not exceed 0.004 inches.

KENVIRONS, INC.
NOZZLE CALIBRATION LOG
NOZZLE ID # 234

DATE: 12-4-79
MEASURED BY: RST

MEASUREMENT NO.	DIAMETER
1	.240
2	.241
3	.242
AVG.	.241

DATE: 8-5-80
MEASURED BY: RST

MEASUREMENT NO.	DIAMETER
1 POST TEST BECHTEL	.239
2	.240
3	.242
AVG.	.240

DATE:
MEASURED BY:

MEASUREMENT NO.	DIAMETER
1	
2	
3	
AVG.	

DATE:
MEASURED BY:

MEASUREMENT NO.	DIAMETER
1	
2	
3	
AVG.	

DATE:
MEASURED BY:

MEASUREMENT NO.	DIAMETER
1	
2	
3	
AVG.	

DATE:
MEASURED BY:

MEASUREMENT NO.	DIAMETER
1	
2	
3	
AVG.	

DATE:
MEASURED BY:

MEASUREMENT NO.	DIAMETER
1	
2	
3	
AVG.	

DATE:
MEASURED BY:

MEASUREMENT NO.	DIAMETER
1	
2	
3	
AVG.	

DATE:
MEASURED BY:

MEASUREMENT NO.	DIAMETER
1	
2	
3	
AVG.	

The difference between the high and low readings shall not exceed 0.004 inches.

80019
POST BECHTEL
RST

KENVIRONS, INC.
NOZZLE CALIBRATION LOG
NOZZLE ID # 175

DATE: 8-5-80
MEASURED BY: RST

MEASUREMENT NO.	DIAMETER
1	.173
2	.169
3	.172
AVG.	.171

DATE:
MEASURED BY:

MEASUREMENT NO.	DIAMETER
1	
2	
3	
AVG.	

DATE:
MEASURED BY:

MEASUREMENT NO.	DIAMETER
1	
2	
3	
AVG.	

DATE:
MEASURED BY:

MEASUREMENT NO.	DIAMETER
1	
2	
3	
AVG.	

DATE:
MEASURED BY:

MEASUREMENT NO.	DIAMETER
1	
2	
3	
AVG.	

DATE:
MEASURED BY:

MEASUREMENT NO.	DIAMETER
1	
2	
3	
AVG.	

DATE:
MEASURED BY:

MEASUREMENT NO.	DIAMETER
1	
2	
3	
AVG.	

DATE:
MEASURED BY:

MEASUREMENT NO.	DIAMETER
1	
2	
3	
AVG.	

DATE:
MEASURED BY:

MEASUREMENT NO.	DIAMETER
1	
2	
3	
AVG.	

The difference between the high and low readings shall not exceed 0.004 inches.

KENVIRONS, INC.
NOZZLE CALIBRATION LOG
NOZZLE ID # 175

ATE: 8·12·79
ASURED BY: RCD.

SUREMENT NO.	DIAMETER
1	.173
2	.173
3	.174
AVG.	.173

DATE: 3·5·79
MEASURED BY: LRS

MEASUREMENT NO.	DIAMETER
1	.169
2	.168
3	.170
AVG.	.169

DATE: 3·16·79
MEASURED BY: LRS

MEASUREMENT NO.	DIAMETER
1	.171
2	.171
3	.169
AVG.	.170

ATE: 7·17·79
EASURED BY: JJM

ASUREMENT NO.	DIAMETER
1	.170
2	.170
3	.169
AVG.	.170

DATE: 7/26/79
MEASURED BY: LRS

MEASUREMENT NO.	DIAMETER
1	.169
2	.168
3	.169
AVG.	.169

DATE: 8·16·79
MEASURED BY: JTM

MEASUREMENT NO.	DIAMETER
1	.165
2	.164
3	.164
AVG.	.164

TE: 10-15-79
EASURED BY: LRS

ASUREMENT NO.	DIAMETER
1	.172
2	.170
3	.169
AVG.	.170

DATE: 10-16-79
MEASURED BY: LRS

MEASUREMENT NO.	DIAMETER
1	.167
2	.168
3	.171
AVG.	.170

DATE: 1-15-80
MEASURED BY: RST.

MEASUREMENT NO.	DIAMETER
1	.174
2	.171
3	.171
AVG.	.172

REF BECHTEL [illegible]
RST

e difference between the high and low readings shall not exceed 0.004 inches.

Thermocouple Calibration

PRE
80019

KENVIRONS, INC.

CONSOLE # D-328
PROBE #
THERMOCOUPLE # 21
UMBICAL # 50 FT.

OPERATOR PJS
LOCATION FRANKFORT
THERMOCOUPLE TYPE "K"
DATE OF CALIBRATION 5-8-80

CONSOLE PYROMETER		REFERENCE THERMOMETER
198°F		194°F
250°F		244°F
271°F	✓	252°F
320°F		307°F
373°F		356°F

FULL CALIBRATION
EPA CALIBRATION (ICE BATH -(3) OR BATH -(3) 300° TO 500°F
± 1.5% ABSOLUTE
REFERENCE THEROMETER
ACCEPT CALIBRATION ✓ RST

POST
80019

KENVIRONS, INC.

THERMOCOUPLE CALIBRATION

CONSOLE # D-494
PROBE # —
THERMOCOUPLE # 21
UMBICAL # 50 FT. SILVER

OPERATOR RST
LOCATION FRANKFORT
THERMOCOUPLE TYPE "K"
DATE OF CALIBRATION 8-6-80

CONSOLE PYROMETER		REFERENCE THERMOMETER
74°F	✓	76°F
49°F		50°F
293°F		290°F

POST TEST CALIBRATION CHECK BECHTEL 80019
EPA CALIBRATION POST (AMBIENT ± 1.5% ABSOLUTE)
REFERENCE THERMOMETER ASTM E-1 FZ
ACCEPT CALIBRATION ✓ RST

PRE
80019

KENVIRONS, INC.

THERMOCOUPLE CALIBRATION

CONSOLE # D-328
PROBE # –
THERMOCOUPLE # 20
UMBICAL # 50 FT.

OPERATOR PJS
LOCATION FRANKFORT
THERMOCOUPLE TYPE "K"
DATE OF CALIBRATION 5-8-80

CONSOLE PYROMETER	REFERENCE THERMOMETER
195°F	190°F
246°F	243°F
265°F	✓ 252°F
313°F	306°F
368°F	356°F

FULL CALIBRATION
EPA CALIBRATION (ICE BATH-(3) OIL BATH-(3) 300° TO 500°F
± 1.5% ABSOLUTE
REFERENCE THERUMETER ASTM E-1 F2
ACCEPT CALIBRATION – RST

POST
80019

KENVIRONS, INC.

THERMOCOUPLE CALIBRATION

CONSOLE # D-467
PROBE # —
THERMOCOUPLE # 20
UMBICAL # 50 FT GREEN

OPERATOR RST
LOCATION FRANKFORT
THERMOCOUPLE TYPE "K"
DATE OF CALIBRATION 8-6-80

CONSOLE PYROMETER	REFERENCE THERMOMETER
74°F	74°F
332°F	328°F
40°F	45°F

POST TEST CALIBRATION CHECK BECHTEL 80019
EPA CALIBRATION POST (AMBIENT ± 15% ABSOLUTE)
REFERENCE THERMOMETER ASTM E-1 F2
ACCEPT CALIBRATION ✓ RST

DRE
80019

KENVIRONS, INC.

THERMOCOUPLE CALIBRATION

CONSOLE # D-328
PROBE # -
THERMOCOUPLE # 28
UMBICAL # 50 FT.

OPERATOR DJS
LOCATION FRANKFORT
THERMOCOUPLE TYPE "K"
DATE OF CALIBRATION 5-8-80

CONSOLE PYROMETER	REFERENCE THERMOMETER
216°F	203°F
269°F	246°F
267°F	257°F
328°F	311°F
375°F	359°F

FULL CALIBRATION
EPA CALIBRATION (ICE BATH-(3) OIL BATH-(3) 300 TO 500°F
± 1.5% ABSOLUTE
REFERENCE THEROMETER ASTM E-1 F2
ACCEPT CALIBRATION ✓ RST

POST
80019

KENVIRONS, INC.

THERMOCOUPLE CALIBRATION

CONSOLE # D- 328
PROBE # -
THERMOCOUPLE # 28
UMBICAL # 75 FT.

OPERATOR RST
LOCATION FRANKFORT
THERMOCOUPLE TYPE "K"
DATE OF CALIBRATION 8-6-80

CONSOLE PYROMETER		REFERENCE THERMOMETER
297°F		290°F
66°F	✓	62°F
47°F		42°F

POST TEST CALIBRATION CHECK BECHTEL 80019
EPA CALIBRATION POST (AMBIENT ± 1.5% ABSOLUTE)
REFERENCE THEROMETER ASTM E-1 FZ
ACCEPT CALIBRATION ✓ RST

Dry Gas Meter Dial Thermometer Calibration

HPC
80019

KENVIRONS, INC.

THERMOMETER CALIBRATION FORM

CONSOLES

CONSOLE I.D. D-328
DATE 5-1-80
OPERATOR DMF

	2" DIAL F°	REF. F°
✓	92	95
IN TEMP.	104	107
# II	108	112

	2" DIAL F°	REF. F°
✓	80	80
OUT TEMP.	100	100
# I	110	112

CONSOLE I.D. D-467
DATE 5-1-80
OPERATOR DMF

	2" DIAL F°	REF. F°
✓	89	95
IN TEMP.	103	107
# IV	108	112

	2" DIAL F°	REF. F°
✓	80	80
OUT TEMP.	100	100
# III	109	113

CONSOLE I.D. D-494
DATE 11-27-79
OPERATOR RST

THERMOCOUPLE

	DIAL F°	REF. F°
✓	90	91
IN TEMP.	102	104
# VI	131	132

THERMOCOUPLE

	DIAL F°	REF. F°
✓	88	91
OUT TEMP.	102	104
# V	131	132

FULL CALIBRATION
REFERENCE THERMOMETER USED ASTM E-1 CZ
EPA CALIBRATION CHECK (HOT BATH 105° to 122°F AND
AMBIENT) ± 5.4 °F
ACCEPT CALIBRATION ✓ RST

D027
B0019

KENVIRONS, INC.
THERMOMETER CALIBRATION FORM

CONSOLES

CONSOLE I.D. 328
DATE 8-6-80
OPERATOR RST

	2" DIAL F°	REF. F°
	72	74
IN TEMP. #II	142	144
	40	40

	2" DIAL F°	REF. F°
	76	74
IT TEMP. #I	142	142
	43	40

CONSOLE I.D. 467
DATE 8-6-80
OPERATOR RST

	2" DIAL F°	REF. F°
	76	74
IN TEMP. #IV	138	142
	41	40

	2" DIAL F°	REF. F°
	77	74
OUT TEMP. #III	138	142
	44	40

CONSOLE I.D. 494
DATE 8-6-80
OPERATOR RST

THERMOCOUPLE

	DIAL F°	REF. F°
	74	74
IN TEMP. #VI	143	144
	41	44

THERMOCOUPLE

	DIAL F°	REF. F°
	74	74
OUT TEMP. #V	147	148
	43	44

POST TEST CHECK
BECHTEL B0019
REFERENCE THERMOMETER USED ASTM E-1 F2
EPA CALIBRATION CHECK (ROOM TEMPERATURE AMBIENT
± 10.8 °F)
ACCEPT CALIBRATION CHECK ✓ RST

Hot and Cold Box Dial Thermometer Calibration

KENVIRONS, INC.

THERMOMETER CALIBRATION FORM
SAMPLE BOXES

BOX I.D. S-3110
DATE 5-2-80
OPERATOR DMF

	2" DIAL F°	REF. F°
	104	104
HOT BOX #A	237	237
	320	320
	1" DIAL F°	REF. F°
	34	37
COLD BOX #A	✓ 54	57
	90	91

BOX I.D. S-3111
DATE 5-2-80
OPERATOR DMF

	2" DIAL F°	REF. F°
	104	104
HOT BOX #B	237	237
	320	320
	1" DIAL F°	REF. F°
	34	37
COLD BOX #B	54	57
	88	91

BOX I.D. S-3112
DATE 5-2-80
OPERATOR DMF

	2" DIAL F°	REF. F°
	91	92
HOT BOX #C	209	208
	339	336
	1" DIAL F°	REF. F°
	36	38
COLD BOX #C	✓ 56	58
	90	91

BOX I.D. S-3113
DATE 5-2-80
OPERATOR DMF

	2" DIAL F°	REF. F°
	91	92
HOT BOX #D	209	208
	339	336
	1" DIAL F°	REF. F°
	40	38
COLD BOX #D	✓ 57	58
	88	91

FULL CALIBRATION ON 1" DIAL
REFERENCE THERMOMETER USED ASTM E-1 62
EPA CALIBRATION (ICE BATH - AMBIENT) ± 2°F
ACCEPT CALIBRATION ✓ RST

POST
B0019

KENVIRONS, INC.

THERMOMETER CALIBRATION FORM
SAMPLE BOXES

BOX I.D. S-3110

DATE 8-6-80

OPERATOR RST

	2" DIAL F°	REF. F°
HOT BOX #A	73	74
	143	143
	37	40

	1" DIAL F°	REF. F°
COLD BOX #A	73	74
✓	261	260
	55	56

BOX I.D. S-3111

DATE 8-6-80

OPERATOR RST

	2" DIAL F°	REF. F°
HOT BOX #B	77	74
	142	143
	37	40

	1" DIAL F°	REF. F°
COLD BOX #B	71	74
	270	267
	59	56

BOX I.D. S-3112

DATE 8-6-80

OPERATOR RST

	2" DIAL F°	REF. F°
HOT BOX #C	70	74
	143	143
	38	40

	1" DIAL F°	REF. F°
COLD BOX #C	74	73
✓	264	262
	55	56

BOX I.D. S-3113

DATE 8-6-80

OPERATOR RST

	2" DIAL F°	REF. F°
HOT BOX #D	74	73
	143	143
	40	40

	1" DIAL F°	REF. F°
COLD BOX #D	73	74
✓	258	257
	56	56

POST TEST CHECK BECHTEL B0019

REFERENCE THERMOMETER USED ASTM E-1 F2

EPA CALIBRATION CHECK (AMBIENT - ICE BATH - AMBIENT)

ACCEPT CALIBRATION CHECK ✓ RST

PRE
80019

Barometer Calibration

KENVIRONS, INC.

DATE: 5-29-80
CALIBRATED BY: RST
LOCATION: FRANKFORT KY.

I.D.	Airguide	Ref. Mercury
No. 101	29.34 (in.)	29.34 (in.)
No. 102	29.34 (in.)	29.34 (in.)
No. 103	29.34 (in.)	29.34 (in.)
No. 104	29.34 (in.)	29.34 (in.)

RECALIBRATE # 102 8-6-80
29.47 (IN.) 29.47 (IN.)

FULL CALIBRATION
PRINCO NOVA TM MERCURY IN GLASS
EPA CALIBRATION
ACCEPT CALIBRATION ✓ RST

Post
80011

KENVIRONS, INC.

BAROMETER CALIBRATION

DATE: 8-7-80
CALIBRATED BY: RST
LOCATION: FRANKFORT KY.

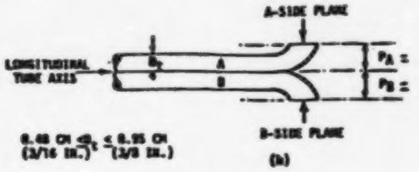
	I.D.	Airguide	Ref. Mercury
	No. 101	_____(in.)	_____(in.)
✓	No. 102	2955 (in.)	29.47 (in.)
	No. 103	_____(in.)	_____(in.)
	No. 104	_____(in.)	_____(in.)

REFERENCE BAROMETER POST CHECK 80019
PRINCO NOVA TM MERCURY IN GLASS
EPA CALIBRATION (± 0.1 IN. Hg.)
ACCEPT CALIBRATION ✓ RST

Pitot Calibration

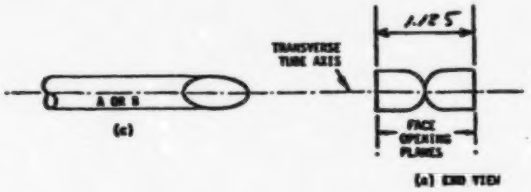
KENVIRONS, INC.
TYPE "S" PITOT TUBES
(CALIBRATION)

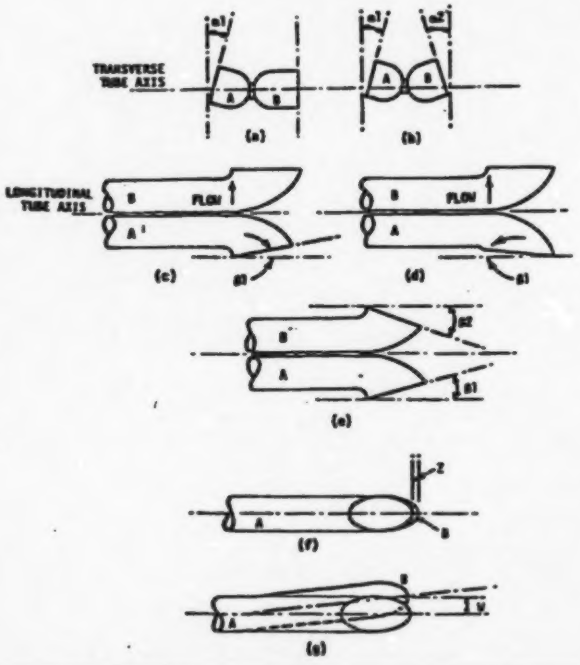
PRE
80019
POST CHECK
RST


A-SIDE PLANE
LONGITUDINAL TUBE AXIS
A
B
B-SIDE PLANE
0.48 CM ≤ Dt ≤ 0.95 CM
(3/16 IN.) (3/8 IN.)
(a)

P_A = .625

P_B = .50


1.125
TRANSVERSE TUBE AXIS
A OR B
(c)
FACE OPENING PLANES
(a) END VIEW


α1
α2
TRANSVERSE TUBE AXIS
A
B
(a)
(b)
LONGITUDINAL TUBE AXIS
FLOW
β1
(c)
(d)
β2
(e)
Z
(f)
W
(g)

(b)A = 2.5 (less than 10°)

(b)B = 0 (less than 10°)

(e)A = 0.5 (less than 5°)

(e)B = 2 (less than 5°)

(f)Z = 0 (less than 1/8")

(g)W = 0 (less than 1/32")

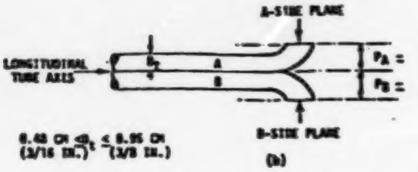
PITOT # II

CALIBRATION 6-10-80

RST

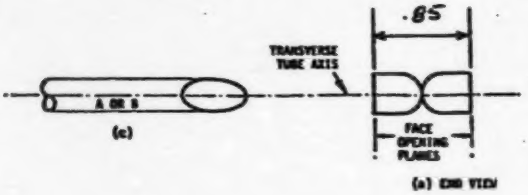
KENVIRONS, INC.
TYPE "S" PITOT TUBES
(CALIBRATION)

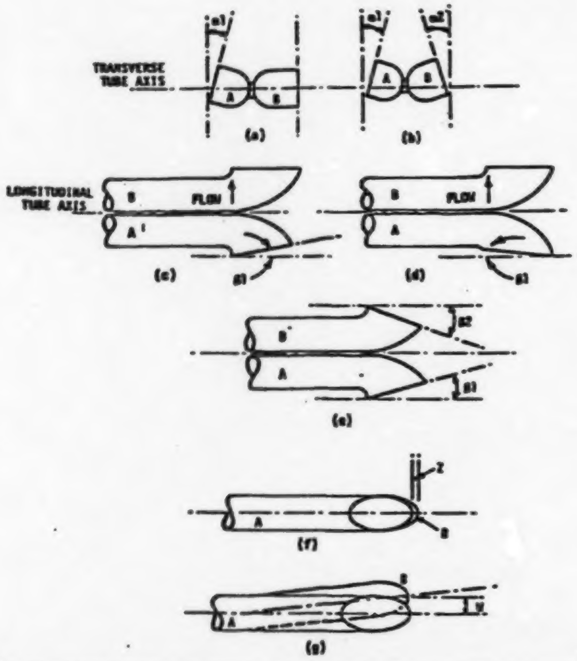
PRE
80017
POST
✓CHECK
RST


A-SIDE PLANE
LONGITUDINAL TUBE AXIS
D_t
A
B
B-SIDE PLANE
0.48 CM ≤ D_t ≤ 0.95 CM
(3/16 IN.) (3/8 IN.)
(b)

P_A = .41

P_B = .44


.85
TRANSVERSE TUBE AXIS
A OR B
(c)
FACE OPENING PLANES
(a) END VIEW


TRANSVERSE TUBE AXIS
α1
α2
A
B
(a)
(b)
LONGITUDINAL TUBE AXIS
B
FLOW
A
β1
(c)
(d)
β2
(e)
Z
(f)
W
(g)

(b)A = 3.5
(less than 10°)

(b)B = 3
(less than 10°)

(e)A = 2
(less than 5°)

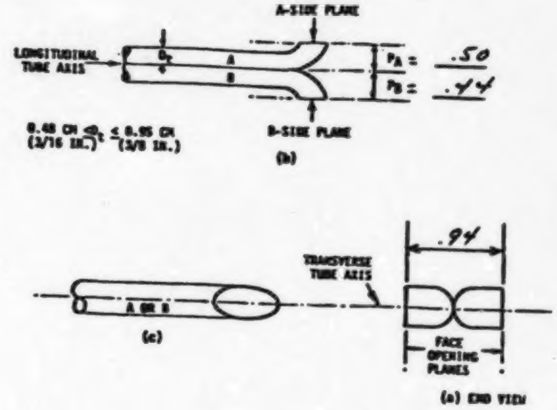
(e)B = 3
(less than 5°)

(f)Z = 1/32
(less than 1/8")

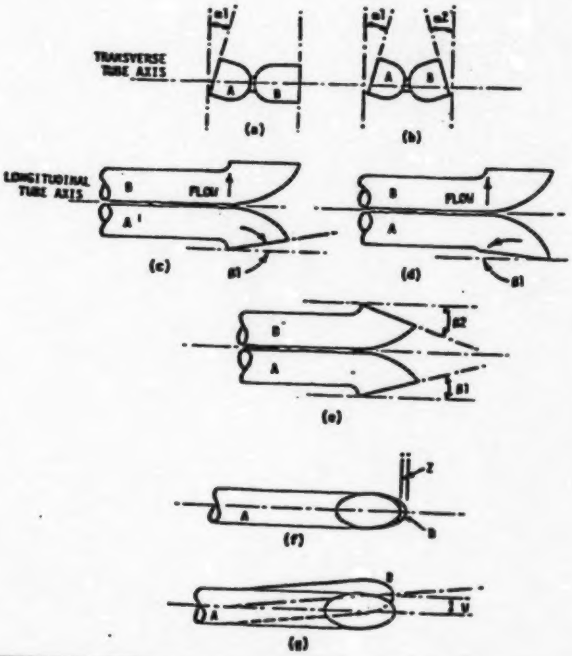
(g)W = 0
(less than 1/32")

Pitot # XII
6-11-80 PRE TEST
RST

KENVIRONS, INC.
TYPE "S" PITOT TUBES
(CALIBRATION)


A-SIDE PLANE
LONGITUDINAL TUBE AXIS
D_t
A
B
P_A = .50
P_B = .44
B-SIDE PLANE
0.48 CM ≤ D_t ≤ 0.95 CM
(3/16 IN.) (3/8 IN.)
(b)
.94
TRANSVERSE TUBE AXIS
A OR B
(c)
FACE OPENING PLANES
(a) END VIEW

PRE
80019
POST
CHECK
RST


TRANSVERSE TUBE AXIS
α1
α2
A
B
(a)
(b)
LONGITUDINAL TUBE AXIS
FLOW
β1
(c)
(d)
β2
(e)
Z
(f)
W
(g)

(b)A = 2.5 (less than 10°)

(b)B = 2 (less than 10°)

(e)A = 2.5 (less than 5°)

(e)B = 0 (less than 5°)

(f)Z = 1/32 (less than 1/8")

(g)W = 0 (less than 1/32")

PITOT # VIII

CALIBRATION 6-10-80

RST

Kenvirons Results
EPA Inter-laboratory Study
(November 1979 and September 1980)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
VIRONMENTAL MONITORING AND SUPPORT LABORATORY
RESEARCH TRIANGLE PARK
NORTH CAROLINA 27711

RECEIVED
NOV 0 8 1979
KENVIRONS, INC.

November 6, 1979

Dear Participant:

Enclosed is the computer printout of your laboratory reported results from our recent 0879 Method 5 source performance survey. This printout has several bits of information pertinent to your reported results. The signed percent difference calculated compares your laboratory reported value with EPA's accepted value for that particular device. The percent difference is calculated as follows.

$$PD = \frac{RV - TV}{TV} \times 100$$

where: PD = percent difference
RV = reported value
TV = true value
100 = factor to change decimal to percent

Also included with the printout is a frequency distribution describing the percent difference in sample results between the participating laboratory and EPA. This distribution was generated to assist each participating laboratory in comparing its performance with that of the other participating laboratories. Although an outlier test was used (Chauvenet's Criteria) that removed some peripheral results, there is no reason on our part to declare those samples invalid.

A typical frequency distribution is read as follows:

10% --------------	50% --------------	90%
-8.3	-3.1	-0.8

Fifty percent of the individual reported values are -3.1 percent or less different than the EPA measurement for those devices. This indicates that 50 percent of the values lie between -15.1 and -3.1 percent with

-15.1 being the minimum (Min) value for the frequency distribution with outliers removed (Table 2). Tables 1 and 2 list the frequency distribution and summary statistics that are based on all collected data from the past three studies (0578, 1078, and 0379) involving volume measurements with a dry gas meter. All values are listed as percent except "# of samples" and "skewness".

If the percent difference between your laboratory results and that of EPA was not what you expected, and you wish to discuss the results, please call me (919) 541-2232. Before calling, please check your volume calculations, and also the latest date of the recalibration of your meter box.

If you have any questions concerning any of our source surveys, or know of anyone who would like to participate, please contact me.

Sincerely yours,

Robert G Fuerst

Robert G. Fuerst, Chemist
Source Branch
Quality Assurance Division (MD-77)
Environmental Monitoring Systems Laboratory

Enclosure

D-328	D-494	D-467
-1.73	0.83	- 0.43

TABLE 1. FREQUENCY DISTRIBUTION OF PERCENT DIFFERENCE (SURVEYS 0578, 1078 AND 0379)

	10%	20%	30%	40%	50%	60%	70%	80%	90%
All data:	-8.9	-6.3	-5.2	-4.1	-3.1	-2.3	-1.3	-0.6	1.2
Outliers removed:	-8.3	-6.1	-5.1	-4.0	-3.1	-2.3	-1.4	-0.7	0.8

TABLE 2. SUMMARY STATISTICS

	n	Min	Max	Median	Mean	Std. Dev.	Skewness
All data:	777	-93.6	353.7	-3.1	-2.1	± 24.3	11.7
Outliers removed:	741	-15.1	7.5	-3.1	-3.4	± 3.6	0.02

A skewness value near zero can indicate a normal distribution around the mean value.

```
                         INTER-LABORATORY STUDY RESULTS                  DATE PRINTED: 11/05/79

                               (    AUGUST    1979   )

                                  POLLUTANT - DGM  ° 147

C36061
ROBERT C. TUSSEY, JR., V.P.
AIR PROGRAMS
KENVIRONS, INC.                                            UNITS - CUBIC METERS
P.O. DRAWER V
FRANKFORT, KY 40602

SITE - 0G2
     ORIFICE NUMBER             REPORTED VALUE             EPA VALUE     PERCENT DIFFERENCE

          157                      0.2627                   0.2642               -.6
          157                      3.2654                   0.2665               -.4          -0.43
          157                      0.2654                   0.2662               -.3
```

```
                          INTER-LABORATORY STUDY RESULTS                 DATE PRINTED: 11/05/79
                              (   AUGUST   1979  )
                               POLLUTANT - ORR #414
K760C1
ROBERT C. TUSSEY, JR., V.P.
AIR PROGRAMS
KENVIRONS, INC.
P.O. DRAWER V                                             UNITS - CUBIC METERS
FRANKFORT, KY 40602

SITE - 063
     ORIFICE NUMBER           REPORTED VALUE               EPA VALUE     PERCENT DIFFERENCE

          157                    0.2666                      0.2646             1.0
          157                    0.2656                      0.2640              .6
          157                    0.2656                      0.2633              .9    Avg. = 0.83
```

```
                         INTER-LABORATORY STUDY RESULTS            DATE PRINTED: 11/05/79
                             (    AUGUST   1979  )
                              POLLUTANT - DGM - #325
C160U1
ROBERT C. TUSSEY, JR., V.P.
AIR PROGRAMS
KENVIRONS, INC.                                              UNITS - CUBIC METERS
P.O. DRAWER Y
FRANKFORT, KY 40602
SITE - OG1
     ORIFICE NUMBER            REPORTED VALUE             EPA VALUE    PERCENT DIFFERENCE

          157                     0.2627                   0.2667          -1.5
          157                     0.2620                   0.2667          -1.8    - 1.73
          157                     0.2617                   0.2667          -1.9
```

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
ENVIRONMENTAL MONITORING SYSTEMS LABORATORY
RESEARCH TRIANGLE PARK
NORTH CAROLINA 27711

RECEIVED
SEP 12 1980
KENVIRONS, INC.

September 10, 1980

Dear Participant:

Enclosed is the computer printout of your laboratory reported results from our recent 0880 Method 5 source performance survey. This printout has several bits of information pertinent to your reported results. The signed percent difference calculated compares your laboratory reported value with EPA's accepted value for that particular device. The percent difference is calculated as follows:

$$PD = \frac{RV - TV}{TV} \times 100$$

where: PD = percent difference
RV = reported value
TV = true value
100 = factor to change decimal to percent

Also included with the printout is a frequency distribution describing the percent difference in sample results between the participating laboratory and EPA. This distribution was generated to assist each participating laboratory in comparing its performance with that of the other participating laboratories. Although an outlier test was used (Chauvenet's Criteria) that removed some peripheral results, there is no reason on our part to declare those samples invalid.

A typical frequency distribution is read as follows:

```
                 10% --------------- 50% ---------------90%
MIN
-13.8            -6.8                -2.3               1.8
```

Fifty percent of the individual reported values lie between -13.8 and -2.3 percent with -13.8 being the minimum (MIN) value for the frequency distribution with outliers removed. The frequency distribution is based on all collected data from the past four studies (1078, 0379, 0879, and 0280) involving volume measurements with a dry gas meter. All values are listed as percent except "# of samples" and "skewness."

If you have any questions concerning these surveys or know of anyone else that would like to participate, please contact me by writing to the above address or phoning (919) 541-2220.

Sincerely yours,

Robert G. Fuerst, Chemist
Source Branch
Quality Assurance Division (MD-77)

Enclosure

FREQUENCY DISTRIBUTION OF PERCENT DIFFERENCE (SURVEYS 0200, 0379, 0879 AND 1078)

All data:

```
 #SAMP      MIN       10%       20%       30%       40%       50%       60%       70%       80%       90%       MAX      MEAN     STDEV

  1742    -93.6      -7.2      -5.3      -4.1      -3.2      -2.3      -1.6       -.7        .2       2.1     353.7      -2.1      16.9
SKEWNESS =   15.10    MEDIAN =       -2.3
```

All data (outliers removed):

```
 #SAMP      MIN       10%       20%       30%       40%       50%       60%       70%       80%       90%       MAX      MEAN     STDEV

  1674    -13.0      -6.0      -5.1      -4.0      -3.1      -2.3      -1.6       -.8        .1       1.8       8.2      -2.4       3.5
SKEWNESS =     .04    MEDIAN =       -2.3
```

INTER-LABORATORY STUDY RESULTS DATE PRINTED: 09/03/80

(AUGUST 1980)

POLLUTANT - DGM

C16001
DR. GARY REVLETT
AIR PROGRAMS
KENVIRONS, INC.
P.O. DRAWER V
FRANKFORT, KY 40602

UNITS - CUBIC METERS

SITE - 001 Console # D-328

ORIFICE NUMBER	REPORTED VALUE	EPA VALUE	PERCENT DIFFERENCE
304	0.2929	0.2923	.2
304	0.2927	0.2922	.2
304	0.2927	0.2922	.2

0.2

```
                                    INTER-LABORATORY STUDY RESULTS              DATE PRINTED: 09/03/80
                                       (    AUGUST   1980  )
                                          POLLUTANT - DGM
      C16001
      DR. GARY REWLETT
      AIR PROGRAMS
      KENVIRONS, INC.
      P.O. DRAWER V
      FRANKFORT, KY 40602
                                                          UNITS - CUBIC METERS
      SITE - 002     #D-467
           ORIFICE NUMBER
                                  REPORTED VALUE              EPA VALUE     PERCENT DIFFERENCE
                 304                  0.2930                    0.2933              -.1
                 304                  0.2928                    0.2929               .0
                 304                  0.2928                    0.2929               .0
                                                                            Ae - a03
```

INTER-LABORATORY STUDY RESULTS DATE PRINTED: 09/03/80

(AUGUST 1980)

POLLUTANT - ORM

CIAC01
DR. GARY REVLETT
AIR PROGRAMS
KENVIRONS, INC.
P.O. DRAWER V
FRANKFORT, KY 40602

UNITS - CUBIC METERS

SITE - 003 #D-494

ORIFICE NUMBER	REPORTED VALUE	EPA VALUE	PERCENT DIFFERENCE
304	0.2940	0.2930	.3
304	0.2937	0.2926	.4
304	0.2937	0.2922	.5

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
ENVIRONMENTAL MONITORING SYSTEMS LABORATORY
RESEARCH TRIANGLE PARK
NORTH CAROLINA 27711

RECEIVED
OCT 13 1980
KENVIRONS, INC.

October 9, 1980

Dear Participant:

I am sending you a copy of your laboratory results of the September (0980) Source Performance Audit Program - Method 6. Included with this copy is a frequency distribution of data received from previous audits for similar samples. The frequency distribution replaces our previous acceptance levels of sample and target ranges. It was generated to assist the participants in judging how well they did compared to what other participants did in similar audits. The absolute percent difference calculated compares the participant's reported values with the EPA accepted value for that particular sample. A typical frequency distribution is read as follows:

SO_2 SURVEYS

Level	NOBS	MIN	10%	50%	90%	MAX	AVE	STD
0.1-500	294	.00	0.30	1.97	6.35	9.35	2.72	2.23

In the concentration level (range) 0.1 to 500 mg SO_2/DSCM, we have 294 analyses. The minimum (MIN) percent difference that a participant got from the EPA accepted value in that range was 0.00 percent, indicating someone reported the same concentration as EPA had determined for that sample. The maximum (MAX) percent difference for all samples in that range was 9.35 percent. The data of this frequency distribution have been subjected to an outlier test (Chauvenet's Criterion). The average (AVE) and the standard deviation (STD) are self-explanatory. Individual frequencies are read as: 50 percent of the participants of these audits analyzing samples within this specific concentration level were 1.97 percent or less from the EPA accepted value.

I would like to remind each participant that we have a sample repository consisting of liquid audit samples from previous audits. We offer these samples to our participants as practice samples. Included with these samples is a list of sample concentrations. The data from these practice samples is not returned to EPA.

If you have any questions concerning the National Source Performance Audit Program, or know of anyone who would like to participate, please contact me at (919) 541-2220.

Sincerely yours,

Robert G Fuerst

Robert G. Fuerst, Chemist
Source Branch
Quality Assurance Division (MD-77)

Enclosure

SOURCE

SO2 FREQUENCY DISTRIBUTION OF PERCENT DIFFERENCE WITH OUTLIERS REMOVED

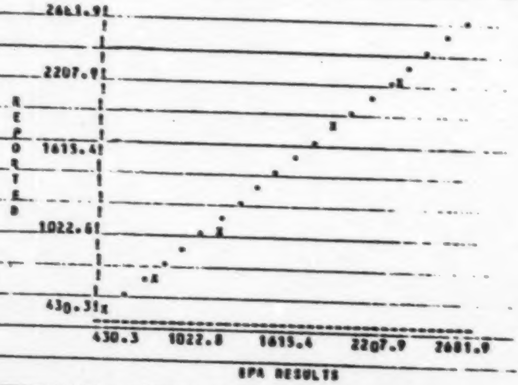
STUDIES INCLUDED: 0380 0979 0379 1078

LEVEL	NOBS	MIN	10%	20%	30%	40%	50%	60%	70%	80%	90%	MAX	AVE	STD
NG/DSCM														
.1- 500.0	294	.00	.30	.92	1.28	1.64	1.97	2.49	3.44	4.43	6.35	9.36	2.72	2.23
500.1-1000.0	303	.00	.39	.70	1.00	1.39	1.67	2.01	2.49	3.28	4.20	6.95	2.08	1.57
1000.1-1500.0	310	.00	.28	.54	.76	1.04	1.38	1.72	2.56	3.34	4.60	7.41	1.98	1.71
1500.1-2000.0	301	.00	.25	.47	.67	.94	1.28	1.60	2.00	2.77	3.89	6.51	1.63	1.49
2000.1-3000.0	312	.00	.25	.41	.80	1.17	1.47	1.96	2.58	3.40	4.89	8.02	2.07	1.80

```
                    INTER-LABORATORY STUDY RESULTS                 DATE PRINTED: 10/06/80
                         ( SEPTEMBER  1980 )
                           POLLUTANT - SO2
C160C1
DR. GARY REVLETT
AIR PROGRAMS
KENVIRONS, INC.
P.O. DRAWER V
FRANKFORT, KY  40602                                 UNITS - MILLIGRAMS PER DRY STD CUBIC METER

       SAMPLE  NUMBER             REPORTED VALUE          EPA VALUE      PERCENT DIFFERENCE

            1456                      1126.5                 1143.9             -1.52
            2309                      1876.4                 1906.3             -1.58
            4479                       755.0                  762.6             -1.00
            5609                      2260.7                 2287.8             -1.10
            8349                       371.1                  381.3             -2.68
```



```
Y =    .988X    -3.350
```